BANK OF CANADA
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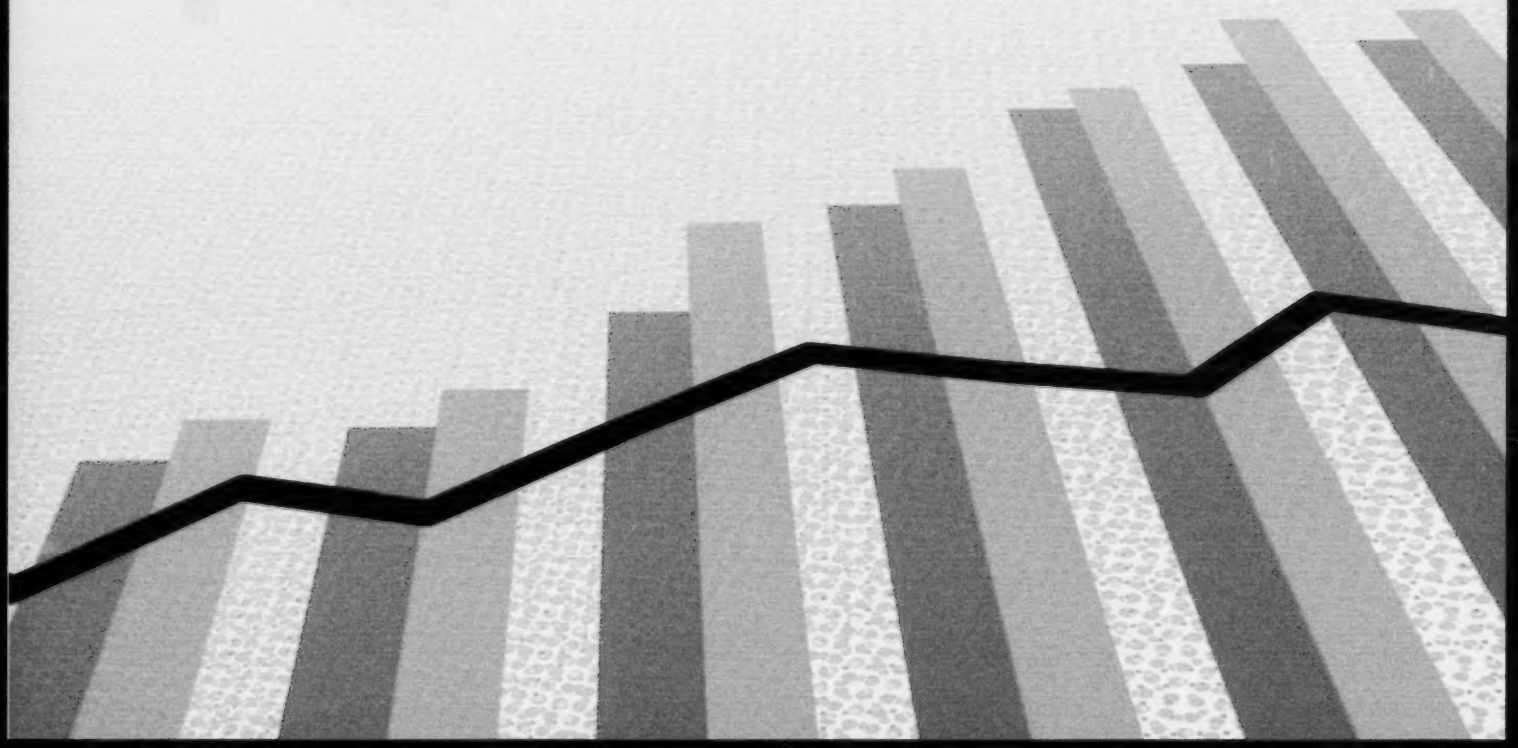
FINANCIAL SYSTEM REVIEW

December 2016



Canada's Financial System

The Financial System and the Economy

- A stable and efficient financial system is essential for sustained economic growth and rising living standards.
- The ability of households and firms to channel savings into productive investments and manage the associated risks with confidence is one of the fundamental building blocks of our economy.

Systemic Risk

- Financial system vulnerabilities are pre-existing conditions that can amplify or propagate shocks. Examples include high leverage and asset price misalignments, as well as maturity and funding mismatches. The interaction between vulnerabilities and triggers can lead to the realization of risks that can impair the financial system and harm the economy.
- Actions to reduce vulnerabilities and increase the resilience of the financial system help reduce systemic risk and support financial stability.

The Role of the Bank of Canada

- As part of its commitment to promote the economic and financial welfare of Canada, the Bank of Canada actively fosters a stable and efficient financial system.
- The Bank does this by providing central banking services, including various liquidity and lender-of-last-resort facilities, overseeing key Canadian financial market infrastructures, conducting and publishing analyses and research, and helping to develop and implement policy.
- The Bank collaborates with international, federal and provincial authorities to achieve its financial system goals.

The *Financial System Review*

- In the *Financial System Review* (FSR), the Bank analyzes the resilience of the Canadian financial system. The first section of the FSR summarizes the judgment of the Bank of Canada's Governing Council on the main vulnerabilities and risks to financial stability. It also highlights the efforts of authorities to mitigate those risks.
- Financial and macroeconomic stability are interrelated. The FSR's assessment of financial risks is therefore presented in the context of the Bank's assessment of macroeconomic conditions, as given in its *Monetary Policy Report*.
- The FSR also presents staff analysis of the financial system and policies to support its resilience. More generally, the FSR promotes informed discussion on all aspects of the financial system.

The *Financial System Review* is available on the Bank of Canada's website at **bankofcanada.ca**.

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This report includes data received up to 8 December 2016.

Contents

Assessment of Vulnerabilities and Risks 1

Macrofinancial Conditions 1

Key Vulnerabilities in the Canadian Financial System 2

Recent Policy Changes Affecting Canada's Housing Sector 3

Vulnerability 1: Elevated Level of Canadian Household Indebtedness 4

Vulnerability 2: Imbalances in the Canadian Housing Market 8

Vulnerability 3: Fragile Fixed-Income Market Liquidity 12

Key Risks 14

Risk 1: Household Financial Stress and a Sharp Correction in House Prices 14

Risk 2: A Sharp Increase in Long-Term Interest Rates Driven by Higher Global Risk Premiums 15

Risk 3: Stress Emanating from China and Other Emerging-Market Economies 16

Risk 4: Prolonged Weakness in Commodity Prices 17

Safeguarding the Financial System 17

Reports 21

Monitoring Shadow Banking in Canada: A Hybrid Approach 23
Bo Young Chang, Michael Januska, Gitanjali Kumar and André Usche

The Rise of Mortgage Finance Companies in Canada: Benefits and Vulnerabilities 39
Don Coletti, Marc-André Gosselin and Cameron MacDonald

Toward More Resilient Markets: Over-the-Counter Derivatives Reform in Canada 53
Michael Mueller and André Usche

Assessment of Vulnerabilities and Risks

Macrofinancial Conditions

Economic growth has been modest

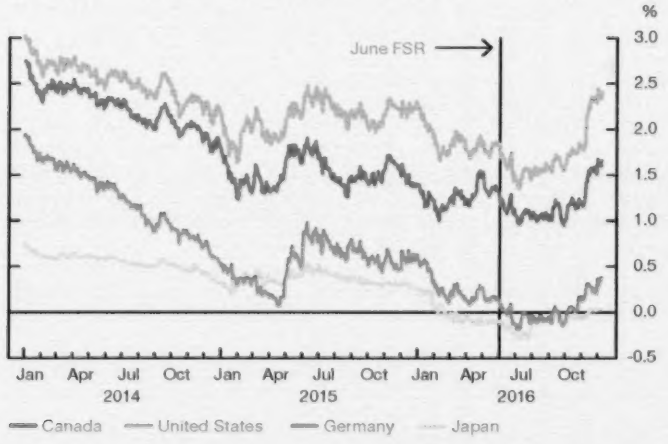
After a disappointing first half of the year, global economic growth has regained some momentum, led by solid fundamentals in the United States and a modest pickup in emerging markets. The adjustment of the Canadian economy to low commodity prices is well under way. Growth in Canada is supported by fiscal measures, as well as accommodative monetary and financial conditions. New housing finance rules will mitigate household vulnerabilities over time and are expected to slow the housing market.

There has been a rapid backup in global bond yields

Yields on long-term government bonds in advanced economies reached new cyclical lows in July, in part reflecting ongoing asset purchases by a number of central banks. In November, however, long-term rates rose in several advanced economies, including Canada, returning close to the levels prevailing at the beginning of the year (**Chart 1**).

Chart 1: **Yields on long-term government bonds in advanced economies have returned close to their January levels**

Yields to maturity on 10-year sovereign bonds, daily data



Source: Bloomberg Finance L.P.

Last observation: 8 December 2016

The rise in global long-term rates was led by the United States, where the yield on 10-year government bonds has increased by around 50 basis points since the beginning of November. Market participants have revised up their expectations of US economic growth and inflation and now anticipate that the Federal Reserve may raise rates more than had been previously expected. This has led to an appreciation of the US dollar, which now sits at its highest level in more than a decade on a trade-weighted basis.

Despite the recent rise in long-term interest rates, monetary policy in advanced economies remains highly accommodative, including the use of unconventional policies, and has helped support elevated asset valuations globally across most asset classes. Since the June *Financial System Review* (FSR), corporate spreads have edged down and stock markets have rallied in the United States and Canada. The volume of corporate bond issuance in the United States is at a historical high.

Concern about the capitalization of some European banks has also increased over the past six months, however. This concern is compounded by uncertainty around potential public sector support for these banks, and the situation has weighed on their stock and bond prices.

Higher government bond yields have led to a rise in mortgage rates in Canada

Mortgage rates in Canada are rising in response to increased funding costs. Higher bank funding costs have been driven by a significant increase in the yield on Government of Canada bonds, while credit spreads for bank funding have declined modestly.

In addition, lenders have reacted to changes in housing finance rules by charging higher rates for specific types of mortgages. For example, some lenders are charging an additional 10 to 15 basis points for refinancing transactions and mortgages with amortization periods longer than 25 years. For these mortgages, lenders no longer have access to mortgage insurance and are therefore facing higher funding costs.

Key Vulnerabilities in the Canadian Financial System

The Bank continues to judge three vulnerabilities as the most important for the Canadian financial system:

- the elevated level of Canadian household indebtedness,
- imbalances in the Canadian housing market, and
- fragile fixed-income market liquidity.

Since the June FSR, federal, provincial and municipal authorities have introduced a series of policy initiatives that affect the evolution of household and housing vulnerabilities. Taken together, the changes will have the greatest effect on household indebtedness by improving the quality of future borrowing. The policy changes are described in the next section, and their effects on household and housing vulnerabilities are analyzed in the sections that follow.

Recent Policy Changes Affecting Canada's Housing Sector

This autumn, the federal government announced several changes to housing finance policy to protect the long-term financial security of Canadians.[1] These initiatives add to a series of policy changes that have tightened housing finance rules since 2008. The new policies include the following:

- *Higher qualifying rate for debt-service calculations.* Under mortgage insurance rules, a borrower's ability to make payments must now be assessed using the greater of the contract interest rate or the benchmark posted rate for five-year fixed-rate mortgages.[2] This requirement was already in place for high-ratio insured mortgages that have variable rates or fixed rates with terms less than five years.[3] It now extends to all insured mortgages. For newly affected borrowers, this change currently represents an increase in the qualifying rate of about 2 percentage points.[4] The higher qualifying rate acts as a type of through-the-cycle stress test to ensure that borrowers can still afford their mortgage payments even if interest rates are higher when they renew or if their household income is reduced.
- *Restrictions on the eligibility of low-ratio mortgages for mortgage insurance.* The criteria for portfolio insurance and other discretionary mortgage insurance have been tightened to bring them in line with the rules for insurance on high-ratio mortgages. This type of insurance is used by lenders to reduce credit risk in a mortgage portfolio and to access funding through the *National Housing Act* Mortgage-Backed Securities or Canada Mortgage Bond programs. Under the new restrictions, insurance will no longer be available for mortgages with an amortization period longer than 25 years or those obtained in refinancing transactions.[5]

Over the summer, the Office of the Superintendent of Financial Institutions (OSFI) announced tighter supervisory expectations for mortgage underwriting, including income verification, and reiterated its plans to strengthen capital requirements for mortgage underwriting and mortgage insurance. The capital treatment of loans secured by residential real estate properties was updated to reflect the reduced certainty around the value of the

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1 Changes were also made to close loopholes in the application of the capital gains tax exemption for principal residences, and the government is consulting on the implementation of lender risk sharing. For further information on these changes, see Department of Finance Canada, "Minister Morneau Announces Preventative Measures for a Healthy, Competitive and Stable Housing Market," 3 October 2016; and Department of Finance Canada, "Department of Finance Canada Launches Consultations on Lender Risk Sharing for Government-Backed Insured Mortgages," 21 October 2016.

2 The benchmark posted rate published on the Bank of Canada's website is the mode (most common value) of the conventional five-year fixed mortgage rates posted at the six largest banks in Canada.

3 Mortgages with a loan-to-value ratio greater than 80 per cent are known as high-ratio mortgages, while other mortgages are known as low-ratio mortgages. All federally regulated and most provincially regulated financial institutions are required to have mortgage loan insurance for high-ratio mortgages.

4 Lenders set posted rates higher than most contract rates for three reasons. First, lenders are not allowed to charge rates above their posted rate and therefore must set the posted rate high enough to compensate lenders for possibly lending to borrowers with riskier characteristics. Second, posted rates are used to calculate the fee that a borrower must pay for exiting a mortgage before it expires. A higher posted rate discourages borrowers from breaking mortgage contracts. Third, by not posting their best rates, lenders improve their bargaining power when negotiating with borrowers. For more information, see J. Allen, R. Clark and J.-F. Houde, "Price Dispersion in Mortgage Markets," *The Journal of Industrial Economics* 62 (3): 377–416, September 2014.

5 Refinancing occurs when a borrower changes lenders or modifies important terms of the loan, such as the size or amortization. Simply renewing a loan at the end of its term is not restricted by the new rules. Other types of mortgages that will no longer qualify for insurance include loans for houses priced over $1 million and loans for the purchase of certain rental properties.

collateral, depending on conditions in the housing market.[6] OSFI also clarified the conditions under which the risk-mitigation benefits of mortgage insurance can be recognized for regulatory capital purposes.

Other new policy measures will also affect the housing sector:

- *Property transfer tax for foreign buyers (Vancouver)*: On 25 July, the BC government announced a 15 per cent transfer tax on residential properties in the Greater Vancouver Regional District for purchasers who are neither permanent residents nor citizens of Canada. The tax came into effect on 2 August.
- *Empty homes tax (Vancouver)*: The City of Vancouver has introduced a tax on empty homes, set at 1 per cent of a home's appraised value each year, to take effect in 2017.
- *Housing affordability measures*: Governments have announced new plans to make housing more affordable, especially for first-time buyers and lower-income households. Among these measures, the Government of Canada announced in Budget 2016 additional funding for affordable housing. It has also completed a consultation process on the National Housing Strategy. In Ontario, the provincial government announced an increase in the land transfer tax rebate for first-time buyers. As well, the BC government announced a $500 million investment in affordable housing.

Vulnerability 1: Elevated Level of Canadian Household Indebtedness

On a national basis, household indebtedness has continued to rise and, more importantly, so has the proportion of highly indebted households in many Canadian cities. Households carrying high levels of debt could find it more difficult to adjust to a loss in income or other financial shock. They may be forced to sharply cut back on their spending and, in severe cases, may default on loans. The consequences for the economy and the financial system could be significant. Policy measures introduced since the June FSR will limit the number of households who become highly indebted when they purchase a house.

Increasing household debt and strong house price growth have continued to reinforce each other, with the national ratio of debt to disposable income approaching 170 per cent (**Chart 2**). Rising indebtedness is sustained by strong growth in mortgage credit, and consumer credit (excluding home equity lines of credit) continues to grow at or slightly above the rate of income growth. National measures of debt payments relative to income (the debt-service ratio) and total debt relative to assets have been generally steady over the past two years. These measures are held down by low interest rates and high house prices, respectively.

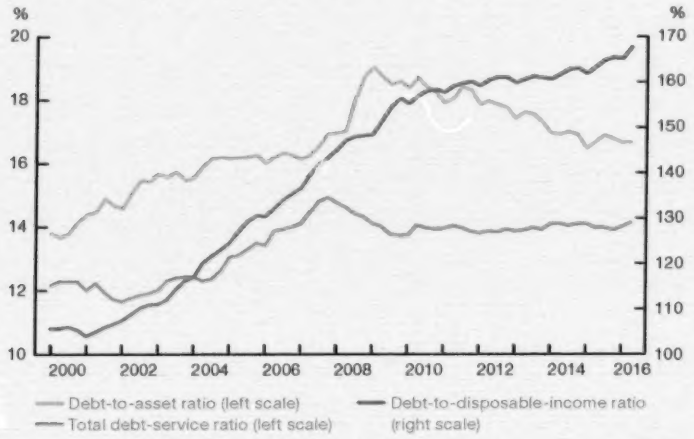
The share of borrowers with high mortgage debt continues to increase

The proportion of borrowers with high mortgage debt relative to income continues to increase in many Canadian cities. **Table 1** shows that, among high-ratio mortgages,[7] the proportion of borrowers with a loan-to-income

6 See OSFI, "Reinforcing Prudent Residential Mortgage Risk Management," 7 July 2016. Changes to capital requirements for mortgage insurers will be implemented in January 2017.

7 Borrowers with high-ratio mortgages are involved in around 40 per cent of resale transactions nationwide. They are somewhat less prevalent in markets where house prices are high, since high-ratio mortgages cannot be used on houses priced over $1 million.

Chart 2: The ratio of debt to disposable income has risen



Sources: Statistics Canada and Bank of Canada calculations — Last observation: 2016Q2

Table 1: The proportion of borrowers with high mortgage debt is increasing in many cities

Percentage of high-ratio mortgage originations with loan-to-income ratios over 450 per cent

	Canada	Toronto	Vancouver	Calgary	Montréal	Ottawa–Gatineau	Halifax
2014Q3	13	32	31	26	10	8	5
2015Q3	16	41	37	32	13	11	6
2016Q3	18	49	39	32	13	13	7

Note: High-ratio mortgages are those with a loan-to-value ratio of more than 80 per cent. Definitions of cities are based on the relevant census metropolitan area.

Sources: Department of Finance Canada and Bank of Canada calculations

(LTI) ratio over 450 per cent rose through the third quarter of 2016.[8] Box 1 of the June 2016 FSR shows similar trends for uninsured mortgages from 2014 to 2015.

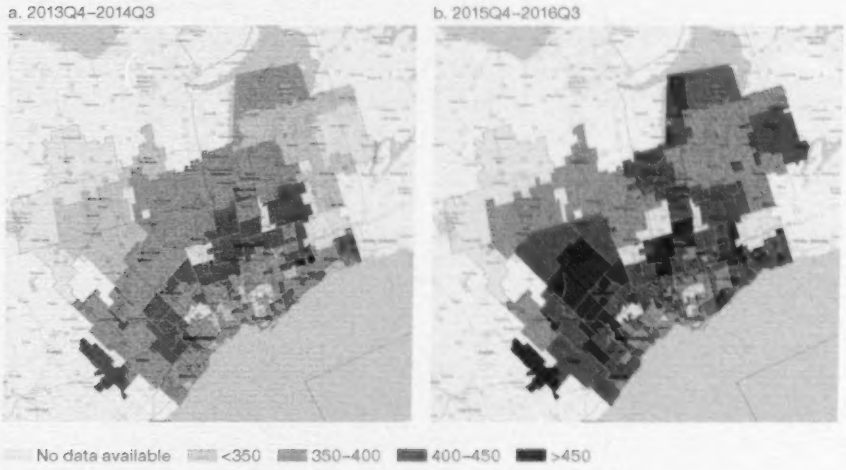
This trend is partly fuelled by rising house prices, particularly in Toronto and Vancouver. For example, almost half of the high-ratio mortgages originated in Toronto in the third quarter of 2016 had LTI ratios exceeding 450 per cent, up from 41 per cent one year earlier. Moreover, high LTI mortgages are spreading throughout the Toronto area (Chart 3)[9] and are also extending beyond the boundaries of Toronto to adjacent cities, such as Oshawa and Hamilton. In these cities, the proportion of high-ratio mortgages with LTI ratios exceeding 450 per cent has more than doubled over the past three years, from around 10 per cent to roughly 25 per cent.

8 The likelihood of a household being unable to make its debt payments after an adverse event increases when the LTI ratio is high. The LTI ratio is a valuable through-the-cycle measure because it does not change directly with changes in interest rates and is only affected by house prices at origination. It is, however, only one of several possible measures of indebtedness.

9 Maps of indebtedness in Toronto, Vancouver and Calgary over several years are available on the Bank of Canada website.

Chart 3: High loan-to-income mortgages are spreading throughout the Toronto area

Average loan-to-income ratio among high-ratio mortgages, per cent



Sources: Department of Finance Canada; Postal Code™ Conversion File (PCCF), 2016; Statistics Canada Catalogue no. 92-154-X; Forward Sortation Area Boundary File, 2011 Census; Statistics Canada Catalogue no. 92-179-X; Google; and Bank of Canada calculations

New housing finance rules will mitigate the rise in highly indebted households

The policy measures introduced by the federal government in the autumn will, over time, have a constructive effect on the number of highly indebted households. To qualify for mortgage insurance, borrowers must have debt-service ratios no higher than the maximum allowable levels for each of two criteria: the gross debt-service (GDS) ratio and the total debt-service (TDS) ratio.[10] The higher qualifying rate used in debt-service calculations will reduce the proportion of borrowers able to qualify for loans with high LTI ratios.

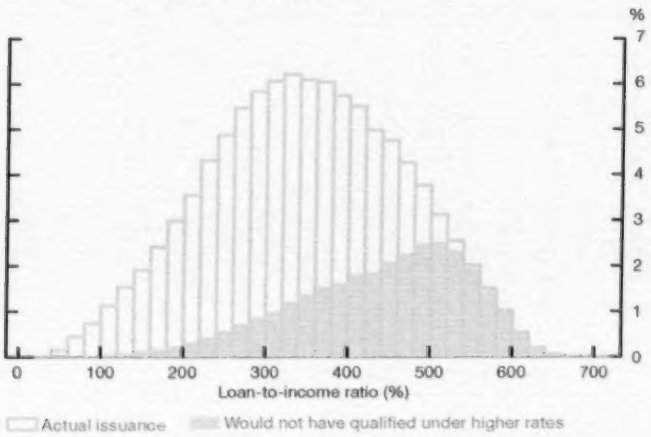
Chart 4 shows the impact of the higher qualifying rate on borrowers if the measures had been in place during the 12 months ending in September 2016. All else being equal, about 31 per cent of high-ratio mortgages issued nationally during that period would not have qualified. The higher qualifying rate used in debt-service calculations will immediately improve the quality of new mortgages and gradually make the overall stock of debt more sustainable than it would have been without the changes.

Table 2 shows the impact that the higher qualifying rate would have had in different cities. Across the country, housing expenses and payments on consumer debt would have caused a significant proportion of borrowers to exceed either the TDS or GDS qualifying criteria (top row). The new qualifying rate used in debt-service calculations would have had its largest effects in the cities where house prices are the highest relative to incomes, such as Vancouver, Toronto and Calgary. This result can best be seen by

10 The GDS ratio consists of the carrying costs of the home, including the mortgage payment, taxes and heating costs, relative to the homebuyer's gross income. The ratio must not exceed 39 per cent (for borrowers with high credit scores). The TDS ratio is the ratio of the carrying costs of the home and all other debt payments, such as those associated with car loans and credit card debt, relative to the homebuyer's gross income. The ratio must not exceed 44 per cent (for borrowers with high credit scores).

Chart 4: **Many high loan-to-income mortgages issued in the past year would not have been eligible under higher qualifying rates**

Issuance of high-ratio mortgages, 2015Q4–2016Q3



Note: Assuming a new qualifying rate of 4.64 per cent. High-ratio mortgages are those with a loan-to-value ratio of more than 80 per cent.

Sources: Department of Finance Canada and Bank of Canada calculations

Table 2: **The effect of higher qualifying rates is determined by both mortgage and consumer debt**

Percentage of high-ratio mortgages that would not have been eligible for mortgage insurance under a higher qualifying interest rate[a]

	Canada	Toronto	Vancouver	Calgary	Montréal	Ottawa–Gatineau	Halifax
TDS and GDS criteria (housing expenses and consumer debt)	31	49	43	44	26	29	23
GDS criterion (housing expenses)	14	33	26	22	12	12	6

a. Based on data from the fourth quarter of 2015 to the third quarter of 2016 and assuming a qualifying rate of 4.64 per cent

Note: TDS is the total debt-service ratio, and GDS is the gross debt-service ratio. High-ratio mortgages are those with a loan-to-value ratio of more than 80 per cent. Definitions of cities are based on the relevant census metropolitan area.

Sources: Department of Finance Canada and Bank of Canada calculations

looking at the GDS criterion alone, which assesses affordability only against housing expenses (second row of **Table 2**). In cities such as Montréal, Ottawa–Gatineau and Halifax, where house prices are not as high, the consumer debt measured in the TDS criterion plays a relatively larger role. Consumer debt is usually much smaller than a mortgage, but since it can have considerably shorter amortization periods or higher interest rates, it can still have an important effect on debt-service ratios.

To qualify under the new rules, some of these borrowers could have chosen a less-expensive home, reduced non-mortgage debt or made a bigger down payment (possibly funded by a co-lending arrangement).[11] To meet the new criteria through less mortgage borrowing alone, the average mortgage

11 In a co-lending arrangement, a borrower uses a second loan from a non-federally regulated lender to obtain funds for the down payment on the primary mortgage. See Box 2 in the June 2015 FSR.

would need to be reduced by roughly 10 per cent. Almost all (95 per cent) of affected mortgages would have qualified with a 20 per cent reduction in borrowing.

Beyond the higher qualifying rates used in calculating debt-service ratios, the tightened rules for obtaining portfolio insurance and other low-ratio mortgage insurance will also affect the accumulation of household debt. For example, more than 40 per cent of recently issued portfolio-insured mortgages had amortization periods longer than 25 years, and a large portion involved refinancing transactions, neither of which are eligible under the new rules. Without access to mortgage insurance, refinancing and long-amortization transactions have already become slightly more expensive or less available.

New policy measures will change the behaviour of lenders and borrowers

Mortgage finance companies are likely to be more affected by the policy changes than large banks. To serve their traditional client base, mortgage finance companies have made extensive use of mortgage insurance—including portfolio insurance—to obtain access to government-backed securitization. All else being equal, 43 per cent of their high-ratio mortgages and at least 59 per cent of their portfolio-insured mortgages issued over the 12 months ending in September 2016 would not have qualified for mortgage insurance under the new rules. With reduced access to mortgage insurance, these lenders may need to change their business strategies.[12]

Borrowers affected by any of the new rules may seek out less-regulated, higher-cost lenders, such as mortgage investment corporations and private mortgage lenders. Since these lenders are not subject to OSFI regulations and, unlike mortgage finance companies, do not use mortgage insurance, they are not constrained by the new rules. Careful attention from authorities will be needed to monitor any increase in vulnerabilities resulting from greater use of alternative lending channels.[13]

Vulnerability 2: Imbalances in the Canadian Housing Market

On a national basis, house prices continue to rise and are now just under six times average household income, their highest recorded level.[14] Both supply and demand factors have played a role (**Box 1**). National housing data continue to mask significant regional divergence. Strong fundamentals underpin housing markets in the Greater Vancouver Area (GVA) and Greater Toronto Area (GTA), but self-reinforcing price expectations may also be supporting price increases. In recent months, however, the housing market in the GVA has begun to slow. Prices are declining modestly in the oil-producing provinces because of demand weakness, while in the rest of Canada, house prices are growing modestly.

Imbalances in some regional housing markets make it more likely that adverse economic shocks could cause large declines in prices, possibly creating financial stress for households as well as for lenders and mortgage insurers who may be relying on housing wealth as collateral for mortgage and consumer loans.

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12 The effects on mortgage finance companies are discussed in more detail in "The Rise of Mortgage Finance Companies in Canada: Benefits and Vulnerabilities," in this issue.

13 Monitoring of non-traditional lenders is discussed in the report, "Monitoring Shadow Banking in Canada: A Hybrid Approach," in this issue.

14 Based on a 12-month moving average Multiple Listing Service price divided by disposable income per household. This series extends back to 1981.

Box 1

House Prices: A Question of Supply and Demand

House prices reflect both local economic conditions and broader national forces such as interest rates and access to credit. **Table 1-A** lists these key demand and supply factors. For each factor, the table presents developments since the oil price collapse in 2014 and then summarizes the anticipated effects of the new policy initiatives described in the section "Recent Policy Changes Affecting Canada's Housing Sector."

The policy measures introduced at the municipal, provincial and federal levels have varying goals and impacts. The largest effect of recent federal policy measures will be to increase the resilience of households and financial institutions to adverse shocks. Households with a lower portion of their income devoted to debt payments have more flexibility to adjust to shocks, such as a sudden rise in interest rates or a reduction in their incomes (**Risk 1**). The policy measures will also reduce demand somewhat relative to what it would have been otherwise. In turn, lower demand will weigh on house prices.

Table 1-A: Key factors influencing house prices

	Developments since 2014	Policy initiatives announced since June 2016 and their anticipated effects
	Demand	
Demographics	▪ growth of home-ownership cohort (25–75 years of age) has averaged about 1.25 per cent per year ▪ net international immigration accounts for about two-thirds of population growth; about one-half settle in British Columbia or Ontario ▪ interprovincial migration to Alberta has shifted down sharply, from a net inflow of just over 10,000 persons in 2014Q2 to a net outflow of about 2,100 in 2016Q2; corresponding flows into Ontario and British Columbia have increased, especially in Toronto, Vancouver and surrounding areas	▪ federal government raised its immigration target in 2016 to 300,000 persons, up from about 272,000 in 2015 ▪ target for 2017 to remain at 300,000 ▪ will boost housing demand, particularly in Toronto, Montréal and Vancouver
Incomes	▪ personal income continues to grow, but with significant variation between oil-producing provinces and the rest of the country ▪ compared with January 2014, employment is up about 4 per cent in Toronto and 6 per cent in Vancouver, well above national growth of about 2.5 per cent	▪ Ontario government's rebate on the land transfer tax slightly improves affordability for first-time homebuyers and increases demand at the margin
Interest rates and access to credit	▪ falling interest rates have increased home ownership, residential investment's share of GDP and housing's share of total employment (e.g., residential investment's share of GDP is up from 6.6 per cent in 2014Q1 to 7.5 per cent in 2016Q3) ▪ increased competition in the mortgage market through brokers and mortgage finance companies	▪ federal government's new housing finance policy improves the quality of new credit; new measures add to the effect of housing finance measures introduced since 2008 ▪ updated OSFI capital requirements will increase bank and mortgage insurer resilience to adverse housing shocks ▪ together, the new housing finance rules and capital requirements will also reduce access to mortgage credit, increase mortgage rates and somewhat dampen housing demand, all else being equal
Investor activity	▪ before imposition of tax on foreign transfers, sales to foreigners accounted for about 10 per cent of sales in Vancouver;[a] data are not available for other cities ▪ indirect evidence suggests that demand from foreign buyers in Vancouver has been trending upward since at least the beginning of 2015[b] ▪ investor demand for condos has been strong in Vancouver and Toronto: about one-quarter and one-third of condos are occupied by renters in Vancouver and Toronto, respectively	▪ BC government's property transfer tax for foreign buyers in the Greater Vancouver Regional District and the City of Vancouver's empty homes tax are expected to reduce foreign demand ▪ the taxes may also divert demand to other major Canadian urban centres
Expectations	▪ self-fulfilling price expectations may also be playing an important role supporting demand in Vancouver and Toronto and surrounding markets	▪ introduction of the federal policy measures has had little effect on house price expectations in 2016Q4[c]

(continued...)

Box 1 (*continued*)

Table 1-A: Key factors influencing house prices

	Developments since 2014	Policy initiatives announced since June 2016 and their anticipated effects
	Supply	
Building activity	▪ national housing starts broadly in line with demographic demand ▪ condo development in Toronto, Vancouver and Montréal dominate overall housing starts, with starts of single-family homes modest, partly reflecting geographic and land-use constraints	▪ federal and provincial government spending contributes to supply of affordable housing
Land-use constraints	▪ residential land-use regulation has restricted new supply in major urban centres (e.g., recent surveys of industry professionals suggest that lengthy and uncertain project approval timelines have restrained residential development)[d]	▪ no major new initiatives to reduce supply constraints imposed by land-use regulations

a. This is based on new land registration data from 10 June to 14 July 2016 collected by the government of British Columbia. Not all purchases classified as made by foreigners are for investment purposes. Purchases by temporary Canadian residents or those planning to move to Canada are also captured in this measure.

b. Data on mortgage originations show an increasing prevalence of mortgage characteristics that are suggestive of foreign buyers. These include the absence of income verification and a clustering of originations at the 65 per cent loan-to-value ratio that banks sometimes use as a cutoff for additional underwriting requirements. The presence and increasing prevalence of these characteristics is most important in the Vancouver market.

c. Results from the Bank of Canada's Canadian Survey of Consumer Expectations for the third and fourth quarters of 2016.

d. K. P. Green, J. Filipowicz, S. Lafleur and I. Herzog, "The Impact of Land-Use Regulation on Housing Supply in Canada," Fraser Institute, 7 July 2016; Green et al., "New Homes and Red Tape in Ontario: Residential Land-Use Regulation in the Greater Golden Horseshoe," Fraser Institute, 4 October 2016; and Green et al., "New Homes and Red Tape: Residential Land-Use Regulation in BC's Lower Mainland," Fraser Institute, 16 July 2015.

The effects of new federal housing finance rules are not yet visible in housing market data. Data from the first half of 2017 should help clarify the evolution of housing market imbalances.

Regional housing markets continue to experience diverging trends

After rising sharply through the first half of the year, national house price growth has plateaued at around 15 per cent on a quality-adjusted year-over-year basis, due in part to a slowdown in price growth in British Columbia (**Chart 5**). In contrast, price growth continued to increase in the GTA, supported by strong migration and supply constraints due to geography and land-use regulation, particularly for single-family detached homes. Starts for apartments and condominiums remain above their historical averages, consistent with continued robust investor activity, as investors are attracted by rising rents and access to low-cost funding. Demand continues to spill over to areas surrounding the GTA, and prices are up sharply in many of these communities.

Employment losses have weighed on housing demand in the oil-producing provinces. Mortgage arrears rates are rising, albeit from low levels, and house prices continue to fall at a modest pace. In much of the rest of the country, housing markets have been steady, and prices are growing broadly in line with the national rate of inflation.

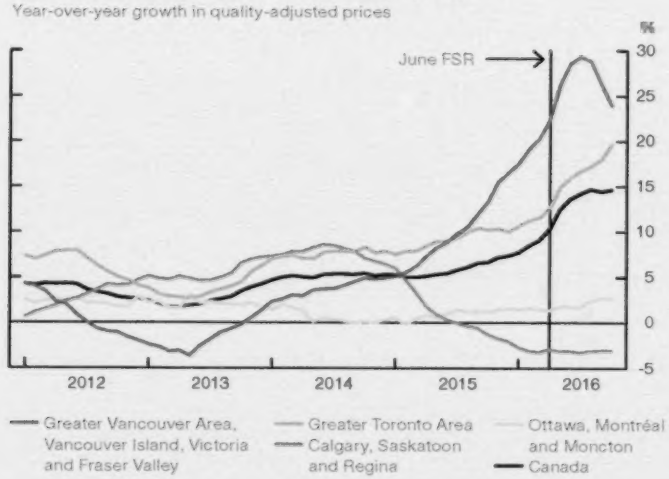
After a period of sharp price growth, the Vancouver housing market has started to slow

Prices in the GVA have risen sharply, up nearly 25 per cent from a year ago. Price growth is supported by strong employment growth as well as limited supply growth due, in part, to geography and land-use regulation. Inventories of newly completed and unoccupied units remain near their lowest levels in 10 years. The June FSR described the pace of price increases in the GVA as unsustainable and raised the possibility that they have been supported by self-reinforcing expectations.

Since the June FSR, there has been a notable downturn in resale activity, with resales falling most steeply for the more expensive neighbourhoods and single-family homes. In more recent months, house price growth has slowed markedly, to -1.5 per cent on a three-month annualized basis (Chart 6).

Chart 5: House price growth differs materially by region

Year-over-year growth in quality-adjusted prices



Note: The lines represent averages of quality-adjusted prices weighted by the population of the corresponding census metropolitan areas as defined by Statistics Canada. The June FSR line is placed to indicate the most recent data available at the time of the report, not the publication date.

Sources: Canadian Real Estate Association, Statistics Canada and Bank of Canada calculations

Last observation: October 2016

Chart 6: Resales are down and price growth has fallen in the Greater Vancouver Area

Note: Both series are seasonally adjusted. The blue shading indicates where the market is roughly balanced between buyers and sellers, based on the sales-to-listings ratio. The June FSR line is placed to indicate the most recent data available at the time of the report, not the publication date.

Sources: Canadian Real Estate Association and Bank of Canada calculations

Last observation: October 2016

The foreign land transfer tax has likely contributed to the decline in resales, although more than half of the drop took place before the tax was introduced in August. It is too early to assess the impact of this tax or the coming empty home tax in Vancouver. Recent land registration data show few purchases by foreigners, but this outcome partly reflects the effect of foreign-resident purchasers who advanced their registration date to avoid the tax. The Bank of Canada's Canadian Survey of Consumer Expectations finds that the percentage of households in British Columbia expecting a drop in prices increased to 25 per cent in the third quarter, from 7 per cent in the second quarter, coinciding with the introduction of the tax and the ongoing market slowdown.[15]

Measures targeting foreign flows in real estate have been applied in jurisdictions around the world. For example, the imposition of a similar tax in Hong Kong in 2012 was followed by a temporary flattening of house prices. Price growth later resumed, driven by overall demand growth and tight supply conditions.

Vulnerability 3: Fragile Fixed-Income Market Liquidity

In the face of adverse shocks, certain fixed-income markets that are prone to rapid declines in liquidity might impede the reallocation of securities and exacerbate price movements, causing the shocks to be amplified or propagated.

Since the June FSR, no significant deterioration in the functioning of fixed-income markets has been observed. During this period, markets faced two important stress events: the referendum on the United Kingdom leaving the European Union and the US election. Bond price movements were large during both events, but market liquidity remained resilient. This result adds to the evidence from other stress events over the past 18 months, which were associated with, at worst, brief declines in market liquidity but no widespread, long-lasting disruption in fixed-income markets.[16]

However, in a survey conducted by the Canadian Fixed-Income Forum, market participants reported a slight decline in overall market liquidity over the past two years; the decline was particularly pronounced in the corporate bond market (**Box 2**). This has led some investors to adapt their fixed-income trading and investing practices.

The structure of fixed-income markets is in transition

Regulatory reforms are designed to make the financial system safer, in part by reducing the risks that dealers take on their balance sheets.[17] In particular, capital and liquidity regulations, together with structural banking reform measures, are increasing the costs to dealers of holding large inventories of corporate bonds. In combination with other factors, notably technological change, the new regulatory regime is changing the way bond transactions are conducted.

There is an ongoing shift from principal trading (where dealers buy and sell bonds using their own balance sheet to temporarily house these assets to facilitate the trading needs of clients) to agency trading (where dealers directly match clients who wish to buy and sell without taking ownership of the bonds in the interim). This shift is particularly pronounced in the corporate bond market.

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15 The development of the survey is described in M.-A. Gosselin and M. Khan, "A Survey of Consumer Expectations for Canada," *Bank of Canada Review* (Autumn 2015): 14–23.

16 China's stock market crash in the summer of 2015 and an episode of risk aversion that affected European bank bonds and Canadian provincial bonds in the first quarter of 2016 are two examples.

17 The largest domestic banks in Canada are the most important fixed-income dealers.

Box 2

Insights from the Canadian Fixed-Income Forum Survey

The Canadian Fixed-Income Forum is a senior-level, industry-wide committee established by the Bank of Canada in 2015 to discuss developments in fixed-income market structure and functioning, market practices, and related policy issues. Between June and August 2016, the Forum conducted a survey on market liquidity, transparency and access in Canadian fixed-income markets. One of its goals was to identify how the level and resilience of market liquidity have changed over the past two years and the effect these changes have had on the trading, execution and portfolio-management practices of investors.

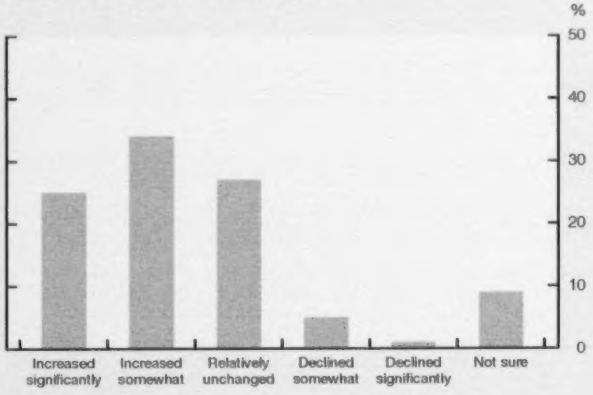
More than 200 firms participated worldwide, representing a broad variety of buy- and sell-side firms, as well as a selection of active domestic issuers. The survey provides a structured approach to gathering qualitative evidence that complements the Bank's analysis of liquidity, and survey responses supply the most comprehensive information to date on the current state of the Canadian fixed-income market.[1]

For most market segments, including the markets for Government of Canada bonds, Canada Mortgage Bonds and provincial bonds, most participants reported only slight declines in the level of liquidity. They also reported increasing liquidity bifurcation: infrequently traded bonds have become even less liquid relative to more frequently traded bonds. However, the primary area of concern for market participants was liquidity in the corporate bond market, which they reported has deteriorated more than in any other fixed-income market in Canada. In addition, market participants remain concerned about the amount of liquidity available during periods of market stress.

Many respondents reported that they adapted their portfolio-management activities in response by holding more recently issued securities and increasing the expected investment horizon for less-liquid assets. They are also modifying their execution strategies by transacting less frequently, allowing more time to execute a trade and dividing larger orders into multiple smaller trades. Some of the most active buy-side market participants are also taking advantage of the new environment by supplying liquidity (offering to transact bonds that others have a strong need to buy or sell) when this can generate a substantial return.

Chart 2-A: The share of corporate bond trading done on an agency basis has increased over the past two years

Question: "How has your share of corporate bond trading done on an agency basis changed in the last two years?"



Note: Results shown are based on responses to the Canadian Fixed-Income Forum Survey conducted between June and August 2016.

Source: Canadian Fixed-Income Forum

Respondents have also increased their share of corporate bond trading done on an agency basis (**Chart 2-A**). However, transactions completed on a principal basis continue to represent the largest share of trades. Despite the adjustments made to their portfolio-management activities, almost 70 per cent of survey respondents reported that they were unsuccessful at least once in the past two years in executing a Canadian-dollar corporate bond trade within their anticipated time frame. The frequency of this occurrence was also noted to be increasing.

1 Complete results of the survey are available in Canadian Fixed-Income Forum, "CFIF Survey Results on Liquidity, Transparency and Market Access in Canadian Fixed Income Markets," October 2016.

At the same time, the importance of asset managers in fixed-income markets is growing. For example, some dealers are beginning to use their relationships with fixed-income exchange-traded funds (ETFs) to source securities and generally gain additional flexibility for managing their inventories. However, if ETFs and other asset managers were required to sell large quantities of fixed-income assets to meet redemptions, this could put stress on market liquidity.[18]

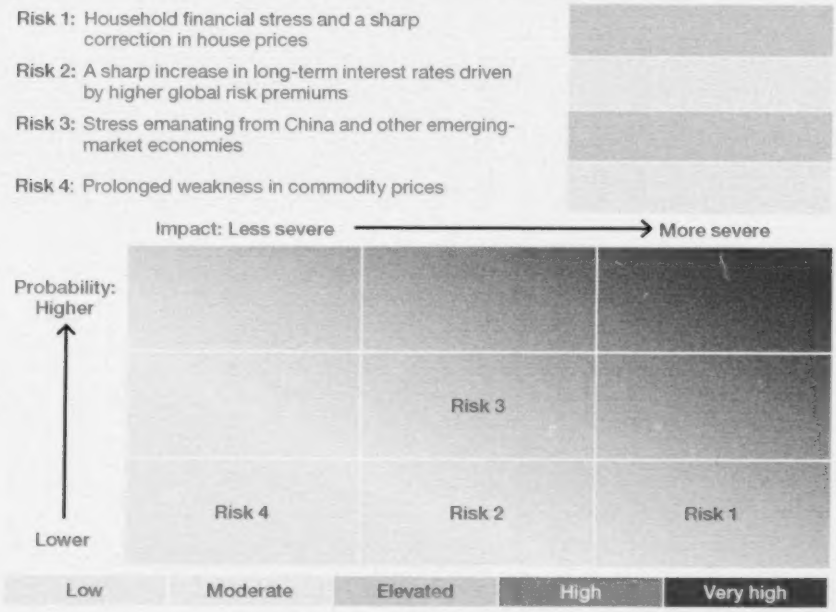
18 The Financial Stability Board is examining potential financial system vulnerabilities associated with asset-management activities. It recently published "Proposed Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities," 22 June 2016.

The changes highlighted here are fundamentally altering trading in fixed-income markets. Although the market has been able to withstand some recent shocks, it is difficult to ascertain how well this evolving market structure will withstand unpredictable and longer-lasting shocks.

Key Risks

This section examines risk scenarios for the Canadian financial system in which trigger events (or shocks) are transmitted and amplified by vulnerabilities, resulting in adverse effects on the financial system and the economy. The purpose is to identify the most important risks rather than all possible negative scenarios. The FSR focuses on downside risks, which are usually low-probability events that have the potential for a significant negative impact on the financial system and the economy should they occur. Each risk includes an overall risk rating based on Governing Council's judgment regarding the probability of the risk occurring and the expected severity of the impact on the Canadian financial system if it were to materialize (**Table 3**). The risks are unchanged from the June 2016 FSR, except for the rating for **Risk 4**, which has decreased from moderate to low.

Table 3: **Key risks to the stability of the Canadian financial system**



Risk 1: Household Financial Stress and a Sharp Correction in House Prices

In **Risk 1**, a large and persistent rise in unemployment across the country is assumed to create financial stress for many highly indebted households, resulting in a significant cutback in consumption spending and a correction in house prices. The decline in house prices is likely to be more pronounced in areas that have experienced strong run-ups, such as the GVA and the GTA. The resulting defaults on loans and declines in collateral values exert

stress on lenders and mortgage insurers. This stress leads to lower credit supply and higher borrowing costs, which amplify the negative feedback to the macroeconomy.

Overall, the risk of nationwide household financial stress combined with a sharp correction in house prices across the country remains "elevated." It has a low probability of occurrence but would have a severe impact if it were to materialize.

Since the June FSR, the likelihood of this risk materializing has increased modestly as a result of weaker economic fundamentals. Household vulnerabilities have also moved higher, increasing the likely severity of the risk should it materialize.

Recent policy actions will, however, mitigate the growth of highly indebted households, reducing the potential impact of this risk over time. New borrowing that creates highly indebted households will not disappear, but it will be constrained significantly. Nevertheless, it will take some time for the existing stock of highly indebted households to diminish substantially. These actions are also expected to dampen house price growth.

A related but different risk is the possibility that, where prices are currently supported by self-reinforcing expectations, policy measures themselves could trigger a decline in prices. As discussed in the June FSR, self-reinforcing expectations may be making prices in Vancouver and Toronto more sensitive to an adverse shock to housing demand. However, the consequences of a downturn in house prices in these markets would be much less severe for the financial system and the economy in the absence of the accompanying large and persistent rise in unemployment nationwide that is part of Risk 1.

Risk 2: A Sharp Increase in Long-Term Interest Rates Driven by Higher Global Risk Premiums

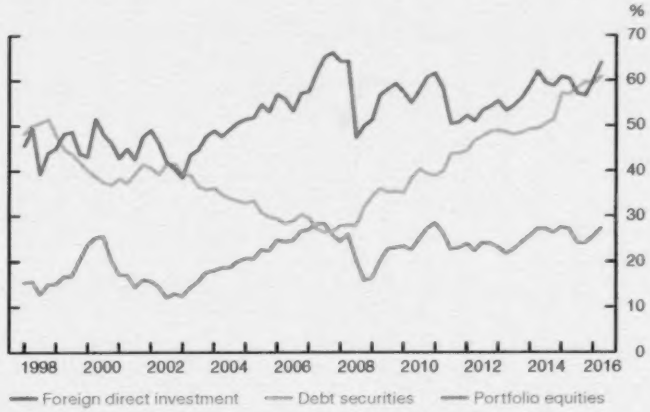
Risk 2 continues to be rated as "moderate" but the impact, should it occur, has increased at the margin. Potential triggers include a reassessment of credit risk due to worsening economic conditions, and a market overreaction to a surprise change in monetary policy by the central bank of a major advanced economy.

A large and persistent rise in global risk premiums and the ensuing increase in interest rates would lead to tighter financial conditions, a drop in confidence, weaker growth and rising debt-service burdens, both globally and in Canada. Since the 2007–09 global financial crisis, Canada's external assets and liabilities have both grown rapidly. On the liability side, this rise is mostly attributable to the purchase of Canadian debt securities by foreign buyers (**Chart 7**). There is a risk that these foreign portfolio investment inflows—which have put downward pressure on borrowing costs for Canadians—could reverse and thus exacerbate the increase in risk premiums. This repricing of risk would prove to be even costlier if fixed-income market liquidity turns out to be fragile.

Since the beginning of November, there has been a rapid backup in global bond yields, with Canadian and US 10-year rates rising by around 40 and 50 basis points, respectively. The rise has been orderly and mostly reflects market expectations of higher growth, inflation and policy rates in the United States over the next few years. Term premiums have risen but remain low, and credit spreads in North America are relatively unchanged.

Chart 7: External liabilities increasingly consist of debt securities

Market value of external liabilities as a percentage of GDP at market prices, quarterly data



Source: Statistics Canada

Last observation: 2016Q2

Central banks in Europe and Japan continue to maintain downward pressure on global term premiums through quantitative easing measures, mitigating the potential for a sharp rise in risk premiums over the short run. The low level of interest rates, however, continues to provide incentives for market participants to search for yield, supporting already-elevated valuations in some asset markets, thereby increasing the impact should this risk materialize.

Risk 3: Stress Emanating from China and Other Emerging-Market Economies

In **Risk 3**, the Canadian financial system could be exposed to stress emanating from China and other emerging-market economies (EMEs). A disorderly depreciation of EME currencies, for example, could lead to the default of corporate or sovereign debt denominated in US dollars, which would weigh on global economic growth and trade. A resulting further reduction in commodity prices could lead to significant volatility across financial markets, which would spill over to the Canadian economy and financial system. This risk continues to be rated as "elevated."

Considerable uncertainty remains around the structural transformation of China's economy and financial system. Chinese economic growth continues to slow modestly toward a more sustainable pace, but activity is still being buoyed by high and growing leverage. High indebtedness is a vulnerability, particularly if growth were to weaken more quickly than expected or interest rates were to rise sharply. In particular, high corporate leverage in China, especially in uncompetitive industries such as steel and coal, may complicate the transformation of China's economy and financial sector. The nature of and interlinkages between the banking and shadow banking systems are also becoming more complex and opaque, increasing the underlying credit risk.

The renewed strength of the US dollar could prove problematic for emerging markets. It could cause stress for firms with large unhedged US-dollar debts or lead to disorderly capital outflows from these countries. There is evidence, however, that firms have begun to reduce their exposure to currency risk.[19]

19 International Monetary Fund, *Global Financial Stability Report: Fostering Stability in a Low-Growth, Low-Rate Era*, Chapter 1, page 30, Chart 6 (October 2016).

Risk 4: Prolonged Weakness in Commodity Prices

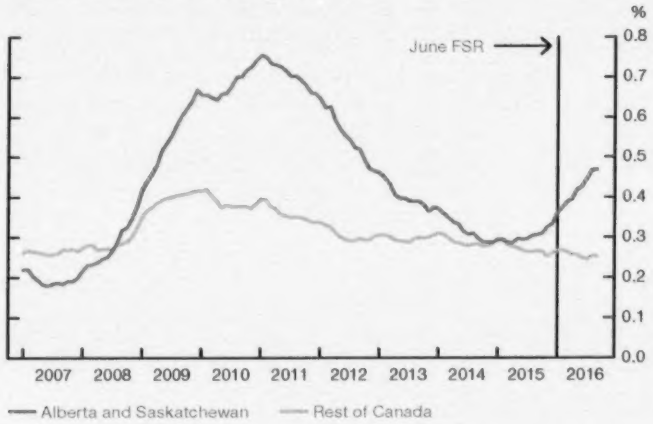
The risk to the financial system from prolonged weakness in commodity prices (**Risk 4**) has been downgraded from "moderate" to "low." Losses from direct exposures of Canadian banks to firms in commodity and related industries have evolved generally as expected. Commodity prices have stabilized, albeit at low levels, and the industries most affected have already undertaken considerable adjustments. In fact, many businesses believe that resource-related activity may be bottoming out.[20]

In contrast, the adverse financial effects on households are still increasing. Unemployment rates in Alberta, Saskatchewan and Newfoundland and Labrador have increased substantially, with the rate in Alberta doubling, from 4.4 per cent in October 2014 to 9 per cent in November 2016. Severance packages, employment insurance and savings may have attenuated and delayed the impact on affected households. As a result, arrears rates on consumer and mortgage credit have grown slowly, from very low levels (**Chart 8**). Arrears rates are expected to continue to rise over the coming months but not to reach levels that will threaten the capital positions of Canadian banks.

Negative spillovers to the rest of the Canadian economy have been limited, and the overall impact on financial institutions has been manageable and broadly in line with expectations.

Chart 8: Mortgage arrears in oil-producing provinces have increased

Share of residential mortgages in arrears



Note: The June FSR line is placed to indicate the most recent data available at the time of the report, not the publication date.

Sources: Canadian Bankers Association and Bank of Canada calculations Last observation: September 2016

Safeguarding the Financial System

Table 4 summarizes the progress of Canadian authorities since the December 2015 FSR in implementing policies to increase the resilience of the financial system. Reforms to address weaknesses identified during the 2007–09 global financial crisis are now well advanced. Authorities are appropriately focused on assessing the effects of the reforms, including potential unintended consequences, and on reducing vulnerabilities identified since the financial crisis.

20 Business expectations are discussed in the Bank's *Business Outlook Survey*, Autumn 2016.

Table 4: **Canada's progress on implementing regulatory reforms in 2016**

Building resilient financial institutions	
Risk-based capital regulations[a]	The Office of the Superintendent of Financial Institutions (OSFI) updated the regulatory capital framework to lay out its approach to implementing in 2017 the countercyclical buffer regime and the Basel Committee on Banking Supervision's rules for equity investment in funds. OSFI issued the final version of its *Life Insurance Capital Adequacy Test*, a guideline for federally regulated life insurance companies.
Liquidity standards	OSFI began consultation on domestic guidelines for the Net Stable Funding Ratio (NFSR). The NSFR will be implemented in 2018, in line with international expectations.
Ending "too big to fail": Recovery and resolution	
Banks	With guidance and feedback from OSFI, domestic systemically important banks (D-SIBs) and several smaller banks submitted the latest iterations of their recovery plans. With guidance from the Canada Deposit Insurance Corporation (CDIC), D-SIBs also submitted their first bank-authored resolution plans, which CDIC will assess. CDIC also continued work on resolution plans for mid-sized member institutions and hosted a resolution tabletop exercise with other federal safety net partners. In June 2016, the legislative framework for the bank recapitalization (bail-in) regime, together with accompanying enhancements to Canada's bank resolution tool kit, received royal assent. Regulations and guidelines setting out further features of the regime will follow.
Insurance companies	Two of three large insurance companies submitted updated recovery plans to OSFI. The third is expected to submit its first plan by the latter half of 2017.
Financial market infrastructures (FMIs)	In June 2016, the Bank published guidance for FMI recovery plans. FMIs are expected to submit first-round plans by the end of December 2016. The Bank and other relevant federal authorities are also examining a Canadian resolution regime for designated FMIs.
Making derivatives markets safer	
Clearing through central counterparties	In February 2016, the Canadian Securities Administrators adopted the Principles for Financial Market Infrastructures published by the Committee on Payments and Market Infrastructures and the International Organization of Securities Commissions. The majority of the provisions came into force in February 2016; the remainder come into force at the end of December 2016.
Completing derivatives reforms	See the report, "Toward More Resilient Markets: Over-the-Counter Derivatives Reforms in Canada," in this issue.
Enhancing the oversight and regulation of the shadow banking sector	
Assessing and mitigating risks from shadow banking	Canadian authorities continue to monitor vulnerabilities associated with shadow banking entities. See the report, "Monitoring Shadow Banking in Canada: A Hybrid Approach," in this issue.
Other domestic initiatives to enhance financial stability	
Mitigating household vulnerabilities	See "Recent Policy Changes Affecting Canada's Housing Sector," in this issue.
Risks from financial technology (fintech)	In October 2016, the Ontario Securities Commission announced the creation of its "LaunchPad" team to provide guidance to firms with fintech products, while keeping securities regulation in step with innovation. In June 2016, Quebec's Autorité des marchés financiers (AMF) created a fintech working group, composed of AMF experts, to analyze fintech innovation and to anticipate regulatory issues. In May 2016, Canada's Competition Bureau launched a study to analyze the competitive impact of fintech and whether there is a need for regulatory reform. Federal and provincial authorities continue to meet regularly to discuss and collaborate on fintech issues.
Systemic risk in capital markets	In May 2016, the Department of Finance Canada released for comment a revised draft of the *Capital Markets Stability Act*. This proposed legislation addresses national data collection, systemic risk related to capital markets and criminal enforcement. The Capital Markets Regulatory Authority is expected to begin operating in 2018.
Increasing transparency of fixed-income trades	In July 2016, the Investment Industry Regulatory Organization of Canada began publishing trade data for certain corporate bonds. It plans to broaden this practice to all corporate bonds in 2017, increasing transparency to better inform investors' decision making.

a. See also the section "Recent Policy Changes Affecting Canada's Housing Sector" for a discussion of capital changes related to housing markets.

There is evidence that the G20's post-crisis agenda for regulatory and supervisory reform is fortifying financial system resilience globally, especially in the banking sector. OSFI implemented the original Basel III revisions in their entirety in 2013, ahead of schedule, helping to reduce the probability of contagion from at home and abroad.[21] The banking sectors in Canada and many other countries have increased their level of capitalization, hold

21 É. Chouinard and G. Paulin, "Making Banks Safer: Implementing Basel III," Bank of Canada *Financial System Review* (June 2014): 53–59.

more liquidity, rely on more-stable funding and are subject to more-effective supervision.[22] Canadian authorities support efforts to finalize the Basel Committee's post-crisis reforms without materially increasing global bank capital requirements. Once these rules are completed, authorities must continue to observe the implications and stand ready to make adjustments if unintended consequences arise.

The implementation of the G20 reforms of the derivatives market is also well advanced, with significant benefits realized through improved transparency and better management of counterparty credit risk. The Canadian perspective on these reforms is discussed in the report, "Toward More Resilient Markets: Over-the-Counter Derivatives Reform in Canada," in this issue.

The Financial Stability Board (FSB) highlighted financial market liquidity (**Vulnerability 3**), cross-border financial integration and the resilience of central counterparties in its annual report on the implementation and effects of regulatory reforms.[23] The FSB is currently developing a framework for post-implementation policy evaluation to assess the effects of the reforms, a move that is welcomed by Canada. The next report, to be delivered to the G20 in mid-2017, will include, among other things, a comprehensive review of derivatives market reforms. Canadian authorities will continue to monitor the impact of the reforms during and after implementation.

Strengthening cyber security

The information technology systems of financial institutions are increasingly complex and interconnected. This creates the risk that a cyber event could impede the ability of financial system participants to conduct transactions for a prolonged period, negatively affecting financial stability. An institution's strong understanding of the cyber threat environment within which it operates—its situational awareness—is crucial to its ability to pre-empt, respond to and recover from cyber events.

Collaboration and leadership needs to come not only from governments and firms within the financial sector, but also from the non-financial firms that they rely on. Examples include information technology service providers, telecommunications firms and electricity providers, as well as government agencies with responsibilities related to these industries. The financial sector must have the ability to identify potential vulnerabilities in these areas.

The Canadian Financial Services Cybersecurity Governance Council provides a forum for Canada's leading financial institutions and infrastructure providers to collaborate to address industry-level cyber resilience issues. Key aspects of the Council's work plan include developing common positions on systemic risk and associated responses, working to identify risks from technology providers, and engaging telecommunications firms and relevant public sector authorities to discuss ways to prevent cyber incidents from being propagated through telecommunications networks.

Public Safety Canada is the federal government department accountable for coordinating Canada's Cyber Security Strategy. It is taking the lead in addressing the significant challenge of building collaboration among industry stakeholders and the federal and provincial governments. It is critical that governments continue to collaborate with stakeholders and take timely action to support stakeholders' ability to address cyber security concerns.

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22 P. Palhau Mora and M. Januska, "On the Nexus of Monetary Policy and Financial Stability: Is the Financial System More Resilient?" Bank of Canada Staff Discussion Paper 2016-12 (May 2016).

23 Financial Stability Board, *Implementation and Effects of the G20 Financial Regulatory Reforms*, 31 August 2016, 2nd Annual Report.

From an international perspective, the Bank of Canada, the Department of Finance Canada and OSFI have been working with their G7 counterparts to identify measures to defend against cyber threats.[24] The Committee on Payments and Market Infrastructures and the International Organization of Securities Commissions also published *Guidance on Cyber Resilience for Financial Market Infrastructures*.

24 See the G7 Fundamental Elements of Cybersecurity for the Financial Sector.

Reports

Reports present work by Bank of Canada staff on specific financial sector policies and on facets of the financial system's structure and functioning. They are written with the goal of promoting informed public discussion on all aspects of the financial system.

Introduction

This issue of the *Financial System Review* features three reports.

In **Monitoring Shadow Banking in Canada: A Hybrid Approach,** Bo Young Chang, Michael Januska, Gitanjali Kumar and André Usche discuss how lending that occurs outside the traditional banking system provides benefits to the economy but must be monitored carefully for potential financial sector vulnerabilities. They describe how the Bank defines and measures shadow banking and how it assesses vulnerabilities in the sector, using an approach that examines both markets and entities.

The Rise of Mortgage Finance Companies in Canada: Benefits and Vulnerabilities, by Don Coletti, Marc-André Gosselin and Cameron MacDonald, examines the increased importance of mortgage finance companies (MFCs) in the Canadian mortgage market. The authors discuss the MFC business model, highlighting MFCs' relationship with mortgage brokers and banks, as well as the benefits they bring to Canadian borrowers. The authors conclude with a discussion of the impact of MFCs on financial system vulnerabilities.

In **Toward More Resilient Markets: Over-the-Counter Derivatives Reform in Canada,** Michael Mueller and André Usche show that the implementation of derivatives market reforms in Canada is well under way and has lessened vulnerabilities. But accompanying changes to market structure have both positive and negative effects that require ongoing attention from authorities.

Monitoring Shadow Banking in Canada: A Hybrid Approach

Bo Young Chang, Michael Januska, Gitanjali Kumar and André Usche

- The shadow banking sector in Canada provides an alternative to banks for intermediating credit to the economy. However, it also has the potential to increase financial sector vulnerabilities, since the sector is not prudentially regulated.
- The Bank of Canada regularly assesses potential vulnerabilities emanating from the shadow banking sector as part of its monitoring of threats to the stability of the Canadian financial system. The Bank's current approach is a hybrid one that examines both markets and entities to ensure broad coverage and capture new parts of the sector as it evolves.
- Based on available information, we judge that the shadow banking sector does not pose large vulnerabilities for the Canadian financial system at this time, mainly because of the limited degree of liquidity and maturity mismatch as well as low leverage in most parts of the sector. The relatively small size of individual subsectors currently also limits the potential for systemic stress.
- However, significant gaps remain in data and knowledge and are likely to persist because of the dynamic nature of the shadow banking sector. The Bank continues to collaborate with domestic and international authorities to fill in these gaps, where possible.

Introduction

Credit intermediation that takes place at least partly outside the traditional banking system is commonly referred to as shadow banking.[1] This sector provides diverse sources of funding to the economy, helps distribute risk among financial sector participants and can also be a source of financial innovation. These elements help to enhance the efficiency and resilience of the financial system.

The experience of the 2007–09 global financial crisis showed, however, that financial stability can be threatened by vulnerabilities originating in the shadow banking sector, especially if they are allowed to grow unchecked.[2]

1 Here, the traditional banking system is defined as prudentially regulated deposit-taking institutions. Shadow banking is sometimes described by other terms, such as market-based finance and non-bank credit intermediation. "Shadow" is not intended to be pejorative, and its use is consistent with the terminology employed in Financial Stability Board and G20 communications.

2 Vulnerabilities are pre-existing conditions that can amplify or propagate adverse shocks throughout the financial system, leading to a rise in systemic risk.

As in the banking sector, vulnerabilities arising from the maturity and liquidity transformation associated with credit intermediation, often in combination with leverage, raise the risk of runs in the shadow banking sector. However, the shadow banking sector is not prudentially regulated or supervised to the same extent as banks. Moreover, the interdependence of the traditional and shadow banking sectors, while beneficial, can act as a mechanism for propagating adverse shocks across the broader financial system. For these reasons, the Bank of Canada regularly assesses potential vulnerabilities emanating from the shadow banking sector as part of its monitoring of threats to the stability of the Canadian financial system. See Chapman, Lavoie and Schembri (2011) and Gravelle, Grieder and Lavoie (2013) for previous descriptions of the Bank's monitoring of the sector.[3]

The shadow banking sector is continuously evolving in response to various factors, including changes in the regulatory environment and financial innovation. Tightening bank regulation, for example, can lead to migration of activity from the traditional banking sector to the shadow banking sector. Conversely, as the scope of regulation increases, elements of the financial sector that were previously considered shadow banking may now fall under regulatory purview. Financial innovation, such as a new product or technology, can change incumbent business models, increase competition and improve the ways in which financial services are provided. The Bank of Canada's monitoring efforts must keep pace with evolving business models and the behaviour of financial sector participants.

Monitoring shadow banking includes both estimating the size of the sector and assessing its potential vulnerabilities and risks. Measuring the size allows us to understand the relative importance of shadow banking and its evolution over time. We estimate that the shadow banking sector is roughly half the size of the banking sector in Canada. But aggregate size alone does not provide a complete picture, since the shadow banking subsectors have different characteristics. Accordingly, we also assess the potential vulnerabilities posed by individual subsectors. However, there are currently many gaps in the data, including a lack of information about the connections between shadow banking and other parts of the financial system. Based on available information, we judge that the shadow banking sector in Canada does not exhibit large vulnerabilities at this time: the individual subsectors do not display a high degree of liquidity and maturity mismatch or elevated leverage, and most are small in size relative to the Canadian financial system.

In this report, we describe the Bank of Canada's current approach to defining and measuring the shadow banking sector and include brief assessments of the current state of vulnerabilities in various subsectors.

Shadow Banking in Canada

Refining the definition

The scope of the shadow banking sector changes over time, reflecting the dynamism of the financial sector. To determine which parts of the financial sector are considered shadow banking, a definition is needed that is both comprehensive and adaptable. The definition allows us to identify bank-like intermediation that is not subject to the rigorous and comprehensive prudential regulation and supervision typically applied to banks.

3 The Bank's previous definition of shadow banking focused on bank-like intermediation activities conducted primarily through markets.

Box 1

The Regulatory Perimeter

Identifying and monitoring shadow banking involves careful examination of the extent, purpose and strength of regulation across the financial system. Entities that are subject to comprehensive, risk-based prudential regulation—such as minimum capital and liquidity requirements that aim to protect their safety and soundness—are not included in the shadow banking sector. Transactions involving only prudentially regulated entities are also excluded. For domestic monitoring, any entity regulated by the Office of the Superintendent of Financial Institutions (OSFI) or by a provincial prudential regulator is considered to be prudentially regulated.

Entities that are not prudentially regulated may still be subject to strong and effective regulation. In addition, many markets have rules and restrictions governing conduct and investor protection that can help reduce vulnerabilities in the financial system. For example, in Canada, regulation of investment funds by securities regulators in certain cases includes rules on liquidity and leverage that reduce the risk of runs. The Bank of Canada still considers some of these funds to be shadow banking, but our assessment of vulnerabilities takes into account the risk mitigation from strong regulation. Similarly, all investment dealers are regulated by the Investment Industry Regulatory Organization of Canada (IIROC) and are subject to liquidity and capital rules.[1] In addition, OSFI assesses the activities of bank-owned investment dealers as part of its prudential supervision of banks, which is done on a consolidated basis. Given that IIROC's supervisory methods and objectives differ in important ways from those of OSFI, bank-owned investment dealers are excluded from the shadow banking sector, but non-bank investment dealers are counted as shadow banking entities.[2] The mitigation of vulnerabilities as a result of IIROC's regulation is reflected in the vulnerability assessment of non-bank dealers.[3]

Monitoring of shadow banking also involves tracking activity into and out of the regulatory perimeter. Ongoing regulatory changes and financial innovation necessitate a continuous reassessment—and, when required, adjustment—of the perimeter to ensure comprehensive monitoring.

1 The term "investment dealer" is mainly used in Canada. Internationally, "broker-dealer" is used to describe the same type of entity.

2 This distinction between bank-owned and other dealers is also a feature of the Financial Stability Board's monitoring of global shadow banking.

3 Foreign bank broker-dealers are excluded from shadow banking as long as they are prudentially regulated under the jurisdiction of the parent bank. However, because of data limitations, they are included in the size estimate for non-bank investment dealers.

The Bank of Canada defines the shadow banking sector as consisting of **entities and markets** that

- conduct or facilitate a **chain of credit intermediation,**
- involve a material degree of **maturity or liquidity transformation,** and
- are at least partly **outside the perimeter of prudential regulation.**

A chain of credit intermediation refers to the provision of credit with at least two links between the issuer and the end-holder of a security or loan. Maturity transformation is the financing of long-term assets with short-term funding. Liquidity transformation refers to financing illiquid assets using liquid instruments. Note also that although some degree of balance-sheet leverage is a possible characteristic of shadow banking, it is not necessary to include it in our definition of shadow banking.[4] **Box 1** provides a discussion of the perimeter of prudential regulation.

The Bank's current approach is to examine both the entities that engage in shadow banking activities and the markets in which shadow banking activities take place. This hybrid method eases measurement challenges and facilitates effective risk assessment. It is important to monitor entities, since engaging in shadow banking activities leads to maturity and liquidity transformation and leverage on their balance sheets, and this information is useful for detecting vulnerabilities in the sector. In addition, the markets in which some entities participate can be opaque, making it difficult to monitor

4 While money market mutual funds engage in shadow banking, they do not have balance-sheet leverage.

their activities from a market perspective. Some shadow banking activities, however, are conducted off-balance-sheet or through entities for which detailed balance-sheet information is not available. In these cases, looking at the market rather than the entity has advantages. Monitoring markets not only overcomes a measurement issue but, more importantly, it also provides information on the interconnections between prudentially regulated entities and the less-regulated sector that can lead to systemic stress.

With the hybrid approach, some double counting may occur when activities are captured in both a market and an entity. To a certain extent, this is an advantage because it minimizes the possibility of overlooking some shadow banking components of the financial system. This methodology is also closely aligned with the definition used by the Financial Stability Board (FSB) to monitor shadow banking globally.[5]

For measurement purposes, the liabilities of entities that are primarily engaged in shadow banking are typically included, although in some cases the assets may be counted instead. For markets, outstanding amounts of securities from transactions that involve at least one entity not subject to prudential regulation are counted. However, when there are gaps in the data, the size of the entire market may be used as a proxy.

Coverage and size of the shadow banking sector

The shadow banking sector can be divided into five major subsectors:

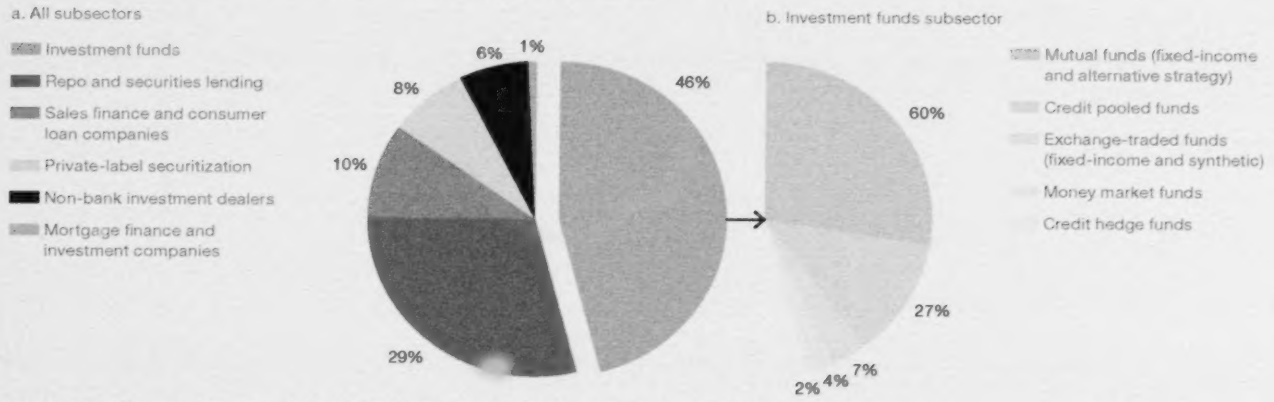
1. Investment funds, consisting of
   a. money market mutual funds (MMFs)
   b. other mutual funds and exchange-traded funds (ETFs)[6]
      - fixed-income and alternative strategy mutual funds
      - fixed-income and synthetic ETFs
   c. prospectus-exempt funds
      - credit hedge funds
      - credit pooled funds[7]
2. Repurchase agreements (repos) and securities lending transactions that involve at least one entity that is not subject to prudential regulation
3. Lenders that are not prudentially regulated, such as mortgage finance companies (MFCs), auto lenders, leasing companies, finance companies and mortgage investment corporations (MICs)
4. Private-label securitization, including asset-backed securities (ABS), asset-backed commercial paper (ABCP) and commercial mortgage-backed securities
5. Investment dealers that are not owned by prudentially regulated banks

5 The FSB's policy framework is available at www.fsb.org/2013/08/r_130829c. In 2016, the FSB published a peer review of country implementation of the framework, available at www.fsb.org/wp-content/uploads/Shadow-banking-peer-review.pdf.

6 The securities issued by these funds must be qualified by a prospectus, a detailed legal document that provides investors with information about the fund. An investment fund can be exempt from filing a prospectus if it meets the requirements set by the Canadian Securities Administrators in National Instrument 45-106 *Prospectus Exemptions*.

7 In this report, "pooled funds" refers to prospectus-exempt funds that employ strategies similar to mutual funds but are sold to institutions and high-net-worth individuals rather than to retail investors. Credit funds are funds that have gross exposures of more than 50 per cent in credit instruments (e.g., bonds, loans, structured/securitized fixed-income securities).

Chart 1: Composition of the shadow banking sector in Canada



Sources: Annual reports of pension funds, DBRS, Markit, Morningstar, Ontario Securities Commission, regulatory filings of Canadian banks, Statistics Canada and Bank of Canada calculations

Last observation: 2016Q2

A major difference in coverage resulting from refining the Bank's definition is the exclusion of *National Housing Act* Mortgage-Backed Securities (NHA MBS) and Canada Mortgage Bonds as shadow banking markets. Although these instruments are part of a credit intermediation chain, they have the explicit backing of the Government of Canada, which mitigates credit risk. Another change has been the treatment of the markets for commercial paper and bankers' acceptances. Instead of including these markets within shadow banking, the investors that perform liquidity and maturity transformation by holding these instruments—such as MMFs—are considered shadow banking entities, which also helps reduce double counting.

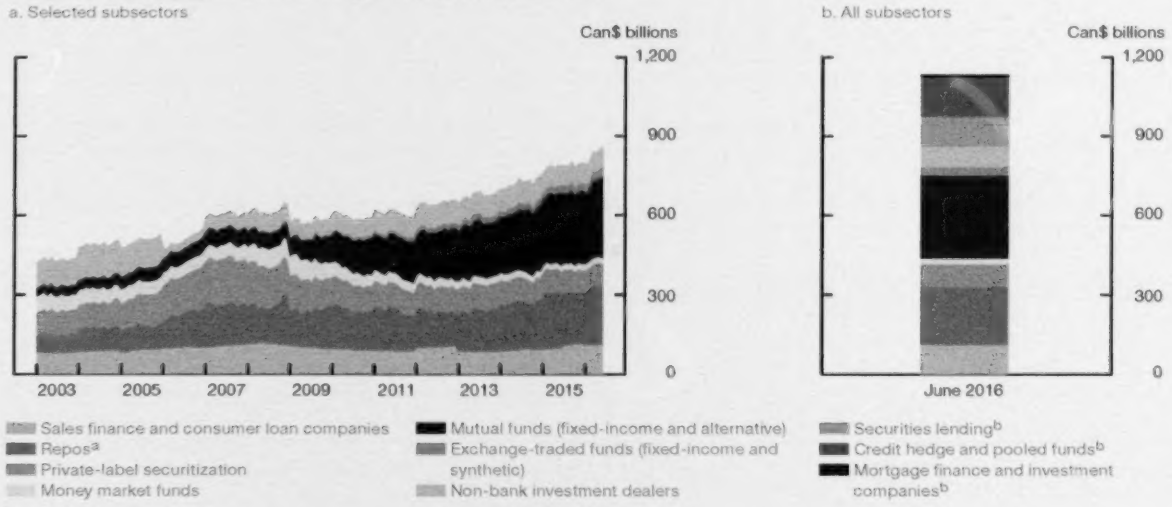
A notable addition to the shadow banking sector is investment funds beyond MMFs. These funds engage in liquidity and maturity transformation, since they purchase less-liquid assets with longer maturities but offer investors the ability to redeem their shares at short notice. Including investment funds aligns with the global shadow banking monitoring exercise conducted by the FSB. Other entities now included in shadow banking are MFCs, sales finance and consumer loan companies, and non-bank investment dealers.

The overall size of the shadow banking sector in Canada is estimated to be $1.1 trillion, roughly half of the $2.1 trillion of traditional bank liabilities.[8] **Chart 1a** shows the relative size of the shadow banking subsectors in Canada. The sector's largest components are investment funds (46 per cent), followed by repo and securities lending transactions (29 per cent).[9] Within the investment funds subsector, fixed-income and alternative strategy mutual funds are the largest components, accounting for 60 per cent of the subsector (**Chart 1b**) and 27 per cent of the shadow banking sector overall. The measurement of the overall size of the shadow banking sector is imperfect, owing to double counting and limitations that arise due to current data gaps. It provides a rough gauge, however, for understanding how the shadow banking sector is evolving and how it compares with other parts of the financial system.

8 Traditional bank liabilities comprise gross deposits (including longer-term Canadian-dollar unsecured debt), subordinated debt and the foreign currency deposits of Canadian residents.

9 The size of repo activities is calculated as the sum of the repo liabilities of the Big Six banks and the eight largest pension funds in Canada. Lack of granular data prevents us from extracting interbank repo liabilities, which should be excluded from the coverage of shadow banking. Hence, the extent of shadow banking through repos is likely overestimated.

Chart 2: Evolution of some shadow banking subsectors in Canada



a. Repos include interbank and pension fund repos.

b. Time-series information is not available for these subsectors.

Sources: Annual reports of pension funds, Bank of Canada, DBRS, Markit, Morningstar, Ontario Securities Commission, regulatory filings of Canadian banks and Statistics Canada

Last observation: June 2016

Chart 2a shows the evolution of some of the shadow banking subsectors. Due to data limitations, we cannot continuously track the evolution of all the subsectors, specifically MFCs, MICs, credit hedge funds, credit pooled funds and securities lending transactions. The shadow banking subsectors shown represent roughly 76 per cent of the overall sector in Canada as of June 2016. The estimated size of these subsectors increased rapidly before the global financial crisis, decreased in its aftermath and recently began to increase again. This latest rise can mainly be attributed to the growth of fixed-income mutual funds and, to a lesser extent, to repo and fixed-income ETFs. In contrast, MMFs and private-label securitization remain stagnant. **Chart 2b** shows all subsectors as of June 2016, including those for which we cannot track the past evolution.

Assessing Vulnerabilities

The shadow banking sector can pose vulnerabilities that may adversely affect the stability of the Canadian financial system. Using the Bank's framework for assessing vulnerabilities, described in Christensen et al. (2015), we regularly evaluate vulnerabilities such as leverage; funding and liquidity (including the degree of liquidity and maturity transformation); pricing of risk; and the degree of opacity in the Canadian financial system, including the shadow banking sector. A variety of inputs, such as quantitative and qualitative indicators, market intelligence, and discussions with other domestic authorities, are used to assess vulnerabilities.

Similar to the traditional banking sector, each of the shadow banking subsectors is susceptible to runs. Although the characteristics and functions of the subsectors vary significantly, they all involve bank-like liquidity and maturity transformation that provide a basis for runs. The impact of runs on the financial system can be magnified by the presence of leverage and

opacity and the interconnectedness of the subsectors with the rest of the financial system. The lower degree of prudential regulation makes regular assessment of vulnerabilities in all shadow banking subsectors especially important.

Overall, based on available information, we judge that the shadow banking sector does not currently pose major vulnerabilities for the Canadian financial system. Structural features in some subsectors make them susceptible to stress, but their relatively small size restricts the potential for systemic stress. However, linkages of the shadow banking sector with the rest of the financial system and the systemic importance of various subsectors are difficult to quantify. In addition, the responses of financial sector participants to regulation and financial innovation may be a source of new vulnerabilities and emerging systemic risks.

Investment funds

A variety of credit-based investment funds that differ by their investor pools and degree of regulation are included in shadow banking. The inherent liquidity and maturity mismatch between the portfolio assets of funds and the potential for on-demand redemptions of the shares in the funds create a risk of runs. While vulnerabilities are currently low for most funds in Canada, certain structural features of funds and the recent growth of fixed-income mutual funds warrant monitoring.

Money market mutual funds

The share of MMFs in the mutual fund industry continues to decline, with MMFs constituting only 2 per cent of the total assets under management, compared with 13 per cent at the time of the financial crisis. The decrease can be attributed to both the smaller size of the assets under management at MMFs ($22 billion as of June 2016) and growth in the overall size of non-money market mutual funds. The low interest rate environment and increased competition from savings accounts offered by banks have both contributed to the decrease. Although this sector is currently unlikely to be of systemic importance for Canada because of its small size, the prevalence of constant net asset value funds and the general absence of a capital cushion make MMFs more vulnerable to runs (Witmer 2012).

Fixed-income mutual funds and exchange-traded funds

Fixed-income and alternative strategy mutual funds had $313 billion of assets under management as of June 2016. Canadian fixed-income mutual funds use limited leverage, which is restricted by securities regulation, and hold sufficient cash and equivalents to manage investor redemptions, suggesting that vulnerabilities are currently limited (Ramirez, Sierra Jimenez and Witmer 2015). However, the continued growth of the mutual fund sector—in particular, funds holding less-liquid assets but offering daily redemptions—has attracted the attention of regulators in many jurisdictions. As a result, the FSB has proposed policy recommendations to reduce the potential vulnerabilities arising from liquidity mismatch in these funds.[10]

Fixed-income and synthetic ETFs had $35 billion in assets under management as of June 2016. Fixed-income ETFs are subject to the same securities regulation as other mutual funds and, currently, vulnerabilities in these funds

10 For more information, see "Proposed Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities," available at www.fsb.org/wp-content/uploads/FSB-Asset-Management-Consultative-Document.pdf.

are low. They are also less likely than mutual funds to face runs because, unlike mutual funds, investors typically do not redeem ETF units. Instead, liquidity is provided by selling the units to other investors on exchanges. The presence of authorized participants—who create and redeem shares to keep the price of an ETF close to the net asset value—reduces but does not eliminate the likelihood of runs (Foucher and Gray 2014). Synthetic ETFs face more significant liquidity and counterparty risks, but their potential to transmit systemic stress is limited by their small size in Canada.

Credit hedge funds and credit pooled funds

Both hedge funds and pooled funds are prospectus-exempt investment pools that face fewer regulatory restrictions than mutual funds or ETFs.[11] Unlike with mutual funds or ETFs, investment in hedge funds and pooled funds is restricted to accredited investors such as institutions and sophisticated or high-net-worth individuals. Hedge funds typically do not offer daily redemptions and often require an initial lock-up period, whereas pooled funds typically offer short-term redemptions on daily or weekly notice. Pooled funds and hedge funds also differ in their strategies; pooled funds employ little leverage and use strategies similar to those of mutual funds, while hedge funds employ alternative strategies, often using leverage.

Only credit hedge funds and credit pooled funds are considered shadow banking for domestic monitoring. These funds face risks of runs and fire sales, depending on their redemption structures. In addition, credit hedge funds may be affected by stress in repo and securities lending markets, which they often rely on for funding.

The size of credit hedge funds in Canada is relatively small, with roughly $9 billion of assets under management as of December 2015.[12] A comparison of the amount of investor funds redeemable in the short term with the estimated liquidation period of investment assets shows a relatively low degree of liquidity mismatch (**Chart 3a**). The reported gross exposure to illiquid securities of credit hedge funds is only 9 per cent of aggregate net asset value. Their median gross leverage of 2.9 is close to the historical average observed for US credit hedge funds between 2005 and 2009 (Ang, Gorovyy and van Inwegen 2011) and is therefore considered to be moderate.[13]

Credit pooled funds had $142 billion of assets under management as of December 2015. These funds have negligible leverage, and their gross exposure to illiquid securities is only 2 per cent of aggregate net asset value. A comparison of the amount of investor funds redeemable in the short term with the estimated liquidation period of investment assets shows a low degree of liquidity mismatch in these funds (**Chart 3b**).

Both hedge funds and pooled funds tend to be relatively opaque, since a prospectus does not need to be filed. The vulnerabilities of credit hedge funds in aggregate are assessed to be moderate, but there is substantial heterogeneity across funds. Even the largest hedge funds in Canada, however, are relatively small at this time and, on their own, are not likely to lead to systemic stress. Credit pooled funds currently exhibit low vulnerabilities.

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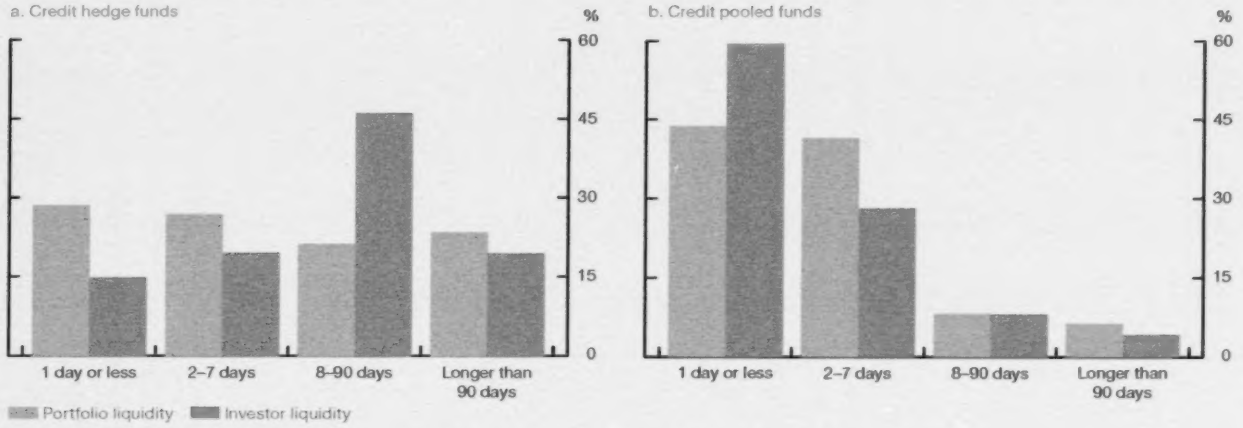
11 Hedge funds and pooled funds are exempt from filing a prospectus by satisfying the requirements set by the Canadian Securities Administrators in National Instrument 45-106 *Prospectus Exemptions*.

12 The information in this section is based on aggregated data from a survey of registered investment fund managers undertaken by the Ontario Securities Commission in 2016. The survey is conducted every two years.

13 Gross leverage is measured as the sum of long and short exposures divided by net asset value. The median is calculated across funds with more than $200 million in assets under management.

Chart 3: Liquidity profiles of credit hedge funds and credit pooled funds

Share of aggregate net asset value



Note: Portfolio liquidity is the percentage of a portfolio that can be liquidated within the specified period. Investor liquidity shows the percentage of investor funds that can be withdrawn in the specified period.

Source: Ontario Securities Commission

Last observation: December 2015

Repo and securities lending

A repo is the collateralized borrowing of cash that financial institutions use for short-term funding (Morrow 1995; Garriott and Gray 2016). A securities lending transaction is a collateralized loan of a security in exchange for cash or other securities.[14]

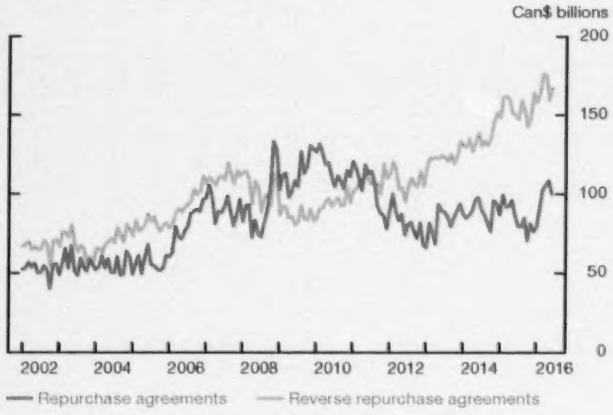
While repo and securities lending play an important role in providing funding liquidity for financial institutions and in support of market-making, using them may lead to a buildup of vulnerabilities (Fontaine, Garriott and Gray 2016; FSB 2013). For example, repo and securities lending transactions are liable to runs when investing borrowed cash or reinvesting cash collateral involves significant maturity or liquidity transformation. These transactions can facilitate a buildup of leverage, which can lead to fire sales of assets funded through the transactions and of assets pledged as collateral in times of stress. Securities lending transactions that do not involve cash can also facilitate leverage. For example, a borrower may exchange a lower-quality security for a higher-quality security (a collateral upgrade), which the borrower can then repo out to obtain cash for a leveraged investment strategy. The chains created by repo and securities lending transactions can act as amplifiers for negative shocks to the financial system.

In Canada, the Big Six banks have been net lenders of cash in the repo market since 2011, and their net lending position grew to $67 billion as of June 2016 (**Chart 4a**). The repo market is also an important source of liquidity and leverage for some of the big pension funds (Bédard-Pagé et al. 2016). Vulnerabilities in the Canadian repo market are mitigated by the fact that most collateral consists of liquid government-issued securities (**Chart 4b**): Government of Canada (GoC) debt (74 per cent), debt of Crown corporations (13 per cent) and provincial debt (12 per cent). We therefore

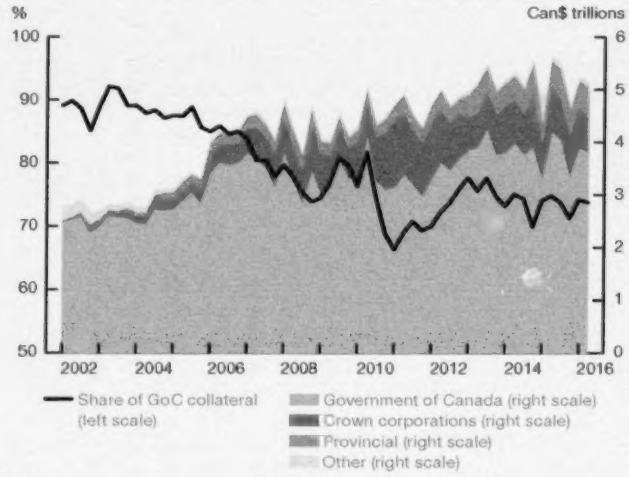
14 A securities lending agreement involving cash collateral is economically similar to a specific repo. Our discussion with market participants indicates that institutions sometimes classify cash-collateralized securities lending as repos, and vice versa. This practice can result in some double counting in our estimation of the size of repo and securities lending activities.

Chart 4: Repo and reverse repo activities

a. Outstanding amount at domestic banks



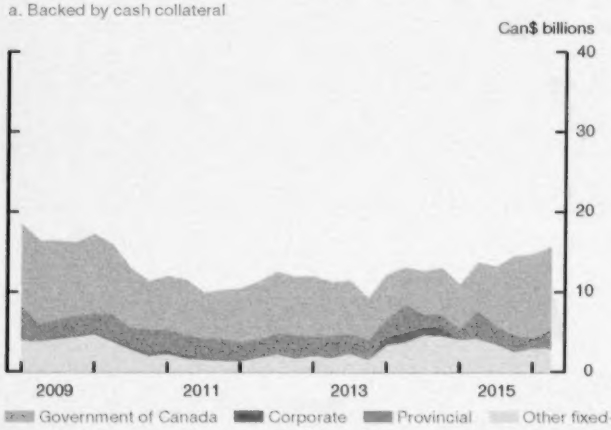
b. Transaction volume, by collateral type (debt securities by issuer)



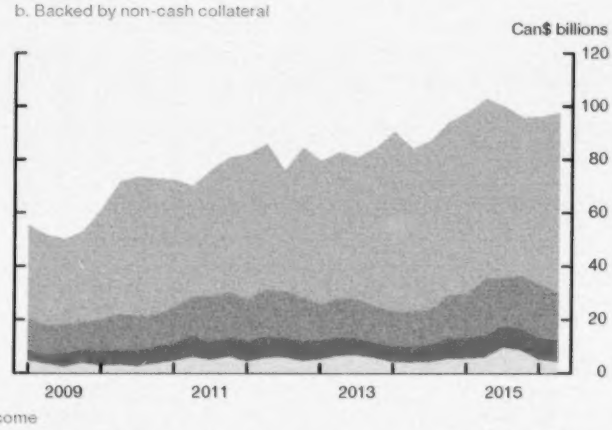
Note: "Other" includes municipal debt, corporate debt and asset-backed securities.
Sources: Bank of Canada and regulatory filings of Canadian banks
Last observation: 2016Q2

Chart 5: Outstanding amount of fixed-income securities lending

a. Backed by cash collateral



b. Backed by non-cash collateral



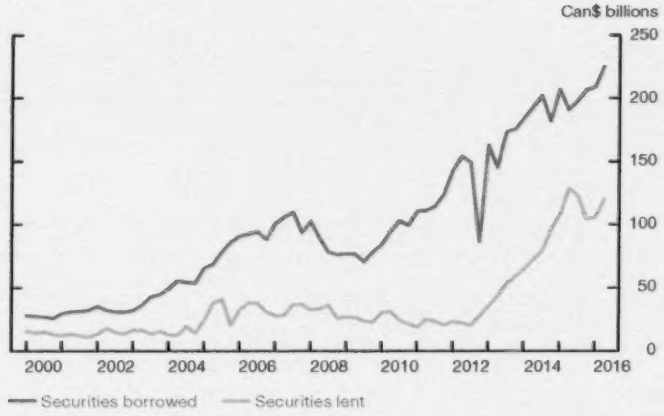
Note: "Other fixed-income" includes commercial paper, asset-backed securities, securities issued by the Canada Mortgage and Housing Corporation and other asset types.
Sources: Markit and Bank of Canada calculations
Last observation: 2016Q2

assess that the vulnerabilities arising from the Canadian repo market are currently low. But the proportion of repos collateralized with GoC debt has been declining steadily. A wider range of less-liquid securities is being used in repo transactions, which increases the degree of liquidity transformation.

The Canadian fixed-income securities lending market is considered shadow banking, and the outstanding amount of securities on loan was estimated to be $113 billion as of June 2016. A majority of the securities loaned consist of GoC bonds (**Chart 5a** and **Chart 5b**). A small number (roughly 14 per cent) of transactions are collateralized by cash in Canada (**Chart 5a**).[15] The cash collateral is typically reinvested in low-risk, liquid products, such as money

15 In contrast, 75 per cent of securities lending transactions are collateralized by cash in the United States (Dreff 2010).

Chart 6: Securities borrowing and lending activity of the Big Six banks



Source: Regulatory filings of Canadian banks

Last observation: 2016Q2

market funds, reverse repos against government collateral or deposits, but it can also be invested in products with greater liquidity risk. For public investment funds such as mutual funds and ETFs, regulation limits the reinvestment of cash collateral in securities with a remaining term to maturity no longer than 90 days. Owing to the low share of cash-collateralized transactions and conservative cash reinvestment practices, the degree of liquidity and maturity transformation due to cash-collateralized securities lending is considered to be limited. For transactions that are backed by non-cash collateral (**Chart 5b**), anecdotal evidence suggests that the main reason for the upward trend in the lending of GoC bonds is collateral upgrades, where relatively illiquid assets, such as provincial bonds and NHA MBS securities, are used to obtain GoC bonds.

The Big Six banks have been net borrowers of securities, and they have recently increased their activity significantly (**Chart 6**). Note that **Chart 6** represents a broader set of securities than **Chart 5a** and **Chart 5b** and includes equities, ETF shares and foreign securities. Market participants have indicated that increased use of arbitrage strategies in the US and European equity markets explains much of the growth shown in **Chart 6**.[16] Unlike collateral upgrades, these arbitrage strategies typically do not lead to a buildup of leverage and therefore pose limited potential for systemic risk. Overall, more-granular data on the type of collateral and cash-reinvestment practices are needed to make a full assessment of vulnerabilities in this sector.

Lenders not subject to prudential regulation

This subsector is composed of lenders that are neither banks nor credit unions and includes finance companies, MFCs and MICs.[17] These entities lie outside the prudentially regulated sector, engage in shadow banking by lending, obtain funding through securitization and other short-term financial

16 Various arbitrage strategies involving ETFs require short-selling of equities or ETF shares. Other arbitrage strategies requiring securities lending include dividend reinvestment trades and cross-border dividend tax arbitrage.

17 Pension funds are also involved in lending outside the banking sector. However, we do not consider this activity to be shadow banking because there is little maturity or liquidity transformation in defined-benefit pension funds (Bédard-Pagé et al. 2016).

instruments, or take on varying degrees of leverage. Together, they account for $125 billion of our shadow banking estimate. We assess current vulnerabilities to be generally low for this subsector.

Finance companies consist of sales finance and consumer loan companies. Sales finance companies finance the purchase of goods and services at the industrial, wholesale or retail levels, often providing term loans to companies and financing leased capital. Consumer loan companies specialize in direct lending to individuals, normally secured by promissory notes. In the second quarter of 2016, the combined total financial assets of finance companies reached $110 billion. Limitations on available data—for example, on individual enterprises—preclude a full assessment of the vulnerabilities of these entities. But, in aggregate, finance companies have relatively low balance-sheet leverage (assets are less than four times equity) and low maturity transformation.

MFCs are mortgage lenders that, as a group, underwrite and service about $165 billion, or 12 per cent, of outstanding residential mortgage credit (as of December 2015). MFCs source their mortgages from brokers and either sell the mortgages to a third party, such as a bank, or fund them with government-backed securitizations. The credit exposure of most of the mortgages they originate is therefore passed on to the government or to the regulated sector and not counted in the shadow banking measurement. Only those mortgages that are being warehoused prior to sale or securitization using either ABCP conduits (about $6 billion) or MFCs' internal resources (about $4 billion) are included in our estimate of shadow banking. Vulnerabilities associated with MFCs primarily relate to their relatively low levels of capital and liquidity and their reliance on funding sources that are potentially unstable during periods of housing market stress (i.e., third-party purchases). The potential vulnerabilities of MFCs are explored in more detail in Coletti, Gosselin and MacDonald (2016).

MICs are Canadian corporations with 20 or more shareholders where each corporation's only undertaking is investing its funds. MICs must always have more than 50 per cent of their assets invested in Canadian residential mortgages or cash deposits. The mortgages are often originated by the MIC or by a closely affiliated lending institution. Assets of publicly listed MICs were just under $5 billion in June 2016. While the lending done by MICs is not subject to prudential regulation, their small size and limited use of leverage suggest that they pose limited risk to the financial system.

Private-label securitization

The outstanding amount of private-label securitization in Canada stood at $87 billion in June 2016, down from a peak of $178 billion in August 2007. Credit cards dominate the assets backing these securities, followed by auto-related transactions and residential mortgages.

Changes in regulation, substitution with covered bonds, competition from public securitization (e.g., NHA MBS) and the retrenchment of the non-bank ABCP market (Kamhi and Tuer 2007) have contributed to the significant decrease in private-label securitization in Canada.[18] Moreover, the complexity of the market has declined and asset quality has improved in the post-crisis period. However, this has increased costs for banks and reduced the relative attractiveness of ABS and ABCP as funding sources, especially for financial entities that have access to a variety of other financing

18 Covered bonds are excluded from shadow banking because they can be issued only by prudentially regulated entities and their assets stay on the consolidated balance sheet of the issuer.

instruments. The restriction on the use of insured mortgages for ABCP, which came into effect on 1 July 2016, with a transition period until 2021, could lead to a more active private market through the replacement of insured mortgages by other assets. The restriction could also reduce the size of the overall ABCP market, a potential development that needs to be monitored.

Given the small size of the Canadian private-label securitization market and the quality of the underlying assets, we currently consider that vulnerabilities in this sector are not elevated.

Non-bank investment dealers

The contribution of non-bank investment dealers to shadow banking in Canada is relatively small. At the end of 2015, their financial assets amounted to $76 billion. The size of the sector has been declining because of reduced activity in the commodity sector—where non-bank investment dealers have an important footprint—and lower profitability due to technological changes and regulation.

Typically, investment dealers have a relatively high leverage ratio (financial-assets-to-equity ratio). The average leverage ratio for all investment dealers increased from 8 in 2008 to 11 at the end of 2015, but it is still below its level of 14 to 15 before the global financial crisis. The growth in leverage for all investment dealers can be attributed to an increase in their repo activities. The leverage ratio for non-bank investment dealers is currently lower, at 8. At the end of 2015, liquid assets accounted for 96 per cent of total assets for all investment dealers and exceeded current liabilities. The amount of liquid assets held is subject to the capital formula used by the Investment Industry Regulatory Organization of Canada, which is designed to ensure that dealers have sufficient liquid assets to meet their obligations. We therefore assess that non-bank investment dealers currently have low vulnerabilities.

Monitoring Challenges

Monitoring of shadow banking entities and markets is challenging, since they are diverse, evolve quickly and are less regulated, all of which restrict the amount of information available and constrain assessments of their size, vulnerabilities and interconnectedness with the rest of the financial system. These issues are particularly acute where data must be aggregated from many different sources to build a national picture. For example, sharing data among many different provincial and federal regulators requires extensive coordination. The Bank continues to work to improve data collection and the availability of relevant data sources. But important data gaps remain and will persist.[19]

For example, the Bank has access only to repo transactions that involve a registered government securities dealer. Transaction-level data that identify counterparties and the types of non-cash collateral are not available for securities lending transactions. Nor are data available on the rehypothecation of collateral for either repo or securities lending transactions. Information on the composition and quality of underlying pools of assets would be helpful to assess vulnerabilities in the private-label securitization subsector. The Bank has access to some data on lenders such as mortgage

19 The FSB's 2016 peer review of shadow banking found that, across jurisdictions, data may not be adequate or granular enough to assess the shadow banking risks of both regulated and unregulated entities. Accordingly, two of the four recommendations to jurisdictions concern the need to address data gaps and to enhance public disclosures, as required, to better understand the risks posed by shadow banking.

finance companies. However, timely information is sparse for auto finance companies; equipment and leasing companies; and prospectus-exempt funds such as hedge funds, pooled funds and MICs.

To address these gaps, the Bank is working with various Canadian agencies to improve access to existing data or to develop new data sources. In addition, market intelligence gathered through regular discussions with industry participants helps us understand important developments and informs our assessment of vulnerabilities in the shadow banking sector.

Another challenge in monitoring the shadow banking sector is rapid innovation in financial system products and practices, which can be driven by regulatory developments or technological advances. An example is the development of peer-to-peer (P2P) lending—the practice of institutional and high-net-worth individuals lending money to other individuals through online lending platforms.[20] P2P platforms tend to be relatively unregulated and may facilitate liquidity and maturity transformations. Although P2P lending remains a small share of financing in Canada and does not currently pose significant risk to the financial system, the Bank continues to monitor activity in this area.

Conclusion

Over the past 20 to 30 years, shadow banking has been an important and growing source of innovation and competition. However, the financial crisis revealed that this sector can also be a source of vulnerabilities that can propagate shocks throughout the financial system. The Bank of Canada has adopted a dynamic monitoring approach that examines both markets and entities to ensure broad coverage and to capture new parts of the sector as it evolves. Based on currently available information, we judge that the shadow banking sector does not pose large vulnerabilities for the Canadian financial system because of the low degree of liquidity and maturity mismatch and the low leverage in most parts of the sector. The relatively small size of most subsectors currently also limits the potential for systemic stress. While stresses in shadow banking markets and entities could lead to losses for some investors, the potential for a system-wide impact is judged to be small at this time. Nevertheless, gaps in the data—particularly on the interconnectedness of the shadow and traditional banking sectors—prevent a complete assessment. The Bank will continue to monitor this evolving sector and work with both domestic and international authorities to share information and learn from their experiences.

20 See "Selected Financial System Developments," in the Bank of Canada *Financial System Review*, December 2015.

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The Rise of Mortgage Finance Companies in Canada: Benefits and Vulnerabilities

Don Coletti, Marc-André Gosselin and Cameron MacDonald

- The structure of the Canadian mortgage market has changed over the past decade, with non-traditional players such as mortgage finance companies (MFCs) rising in importance, driven in part by government policy and advances in information technology.
- MFCs have a complex relationship with the major banks that is both co-operative and competitive. While some banks rely on MFCs to underwrite and service broker-originated mortgages, MFCs also rely on banks to fund their operating capital and a significant share of their mortgage lending. At the same time, MFCs and banks compete for broker-originated mortgages.
- Mortgage borrowers have benefited from the presence of MFCs through the lower mortgage rates and increased availability of credit that arise from greater competition. These benefits have been accompanied, however, by an increase in certain financial system vulnerabilities.
- The systemic risk associated with MFCs is largely mitigated by the fact that their mortgages are mostly insured and their lending practices are influenced by federal regulations. Nonetheless, the performance of MFC-originated mortgages remains important, since it can affect their access to funding and potentially strain their limited capital and contingent liquidity, particularly in a severe economic and housing downturn. If a large MFC were to fail or be unable to fund new loans, it would be disruptive for the mortgage market, possibly magnifying the impact of the downturn.
- Due to MFCs' reliance on government-backed insurance and securitization programs, they are expected to be more affected by the policy changes announced by the federal government in early October than traditional lenders such as banks and credit unions.
- Since MFCs are not directly subject to prudential regulation and supervision, there remains an ongoing need to monitor their business models and the impact of their activities on financial system vulnerabilities.

Introduction

Obtaining a residential mortgage in Canada has traditionally involved a single prudentially regulated and supervised institution handling the entire process from application to ongoing administration.[1] Since the mid-1990s, this has typically been one of the Big Six Canadian banks. Over the past decade, however, new players have become more important and have changed the face of the Canadian mortgage market.[2]

New lenders such as mortgage finance companies (MFCs), mortgage investment corporations (MICs) and private investors have increased their presence in the market.[3] MFCs are non-depository financial institutions that underwrite and administer mortgages sourced through brokers. Their lending is funded mainly through securitization or direct sales to third parties, primarily the Big Six banks. MFCs also generally service the mortgages they underwrite or contract with other MFCs that provide this service.

MICs and other private investors typically deal in uninsured, customized mortgage products that are not available through traditional channels. These products include non-prime loans, second mortgages and very short-term mortgages.[4] Investors in MICs take on greater risk and therefore receive higher returns. While MICs and private investors remain a small part of the Canadian residential mortgage market, MFCs have become more significant.

This report provides an overview of the increased importance of MFCs in the Canadian mortgage market. We discuss the MFC business model, highlighting their complex relationship with banks as well as the benefits MFCs bring to Canadian borrowers. Finally, we assess the impact of their presence in the mortgage lending chain on financial system vulnerabilities.[5]

The Evolving Structure of the Canadian Mortgage Market

The traditional process for obtaining a residential mortgage in Canada is relatively simple. Most commonly, potential borrowers begin with an application at a bank or credit union ("origination"). Documentation is collected and the institution assesses the credit risk of the applicant and the value of the property ("underwriting"). If approved, the mortgage is typically funded by the institution's own deposits ("funding"). The ongoing administration of the mortgage is also done by the same institution ("servicing").

The residential mortgage market in Canada is still heavily dominated by the traditional process and institutions. Nonetheless, since the late 1990s, MFCs have taken on a progressively larger role in the underwriting and servicing of mortgages.

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1 The dominance of the Big Six banks began during the period of consolidation that followed the passing of the 1992 *Bank Act*, when they acquired nearly all of the trust companies. See Freedman (1998).

2 See Crawford, Meh and Zhou (2013) for a broader discussion of the Canadian mortgage market.

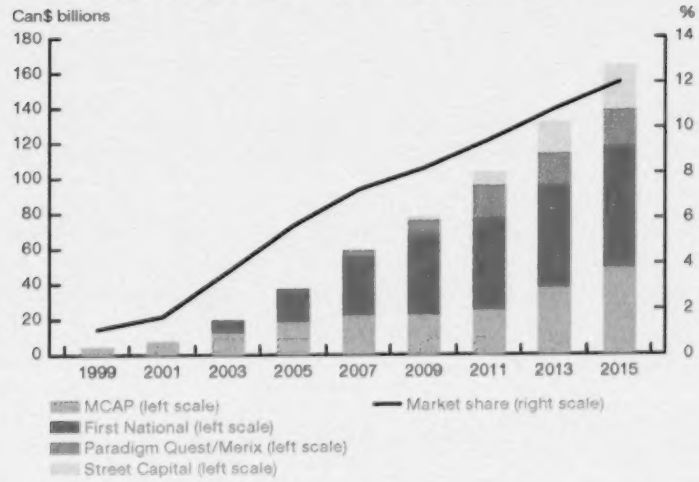
3 See Box 2, Bank of Canada *Financial System Review* (June 2015).

4 Some MICs offer co-lending products, where an MIC provides a second mortgage in conjunction with a first mortgage from a traditional lender. Although the interest costs are high, this type of product allows borrowers with down payments of less than 20 per cent to avoid the requirement to purchase mortgage insurance.

5 A vulnerability is a pre-existing condition that can amplify and propagate shocks throughout the financial system, leading to a rise in systemic risk. See Christensen et al. (2015) for further details about the Bank's approach to monitoring vulnerabilities in the financial system.

Chart 1: **Mortgage finance companies have gained significant market share in residential mortgage underwriting since the early 2000s**

Mortgages under administration and market share of the top four MFCs



Sources: MFC reports, Standard & Poors and Bank of Canada calculations Last observation: 2015

MCAP Financial Corporation, the first MFC in Canada, was incorporated in 1997 as a wholly owned subsidiary of Mutual Trust (a federally regulated financial institution) to manage the trust's residential mortgage operation. In 1998, MCAP was split off as an independent entity so that it could originate, trade and service mortgages for a broader range of companies.[6]

In the early 2000s, First National Income Trust (later First National Financial) became the second MFC to enter the market. The market share of MFCs grew rapidly between 1999 and 2007, from $5 billion of outstanding mortgages (about 1 per cent) to $60 billion (about 7 per cent). Several other MFCs have emerged since 2007, including Paradigm Quest Incorporated/Merix Financial and Street Capital Financial Corporation. The collective market share of these four MFCs rose to more than 12 per cent in 2015 (**Chart 1**).[7] While activity is concentrated in a few large entities, other smaller MFCs, such as Radius Financial, CMLS Financial and Canadiana Financial Corporation, are also active lenders.

The rise of MFCs in Canada has been supported by the combination of government policies designed to promote increased competition in the mortgage market and a number of advances in information technology. Most importantly, the availability of government-backed mortgage insurance and securitization programs has improved the viability of the "originate-to-sell" business model used by MFCs.

Because it eliminates credit risk for investors, mortgage insurance greatly enhances the marketability of mortgages, whether they are sold as whole loans or through securitizations. As a result, the vast majority of the mortgages originated by MFCs are insured, either individually at origination or

6 This information is taken from the MCAP website at www.mcap.com/about-mcap/history.

7 Mortgages under administration include mortgages underwritten and serviced by the institutions themselves, as well as mortgages originated by smaller MFCs that are subcontracted to the institutions for servicing. Unless otherwise noted, the amounts associated with MFCs in this report include those for the biggest four MFCs for which there is publicly available information.

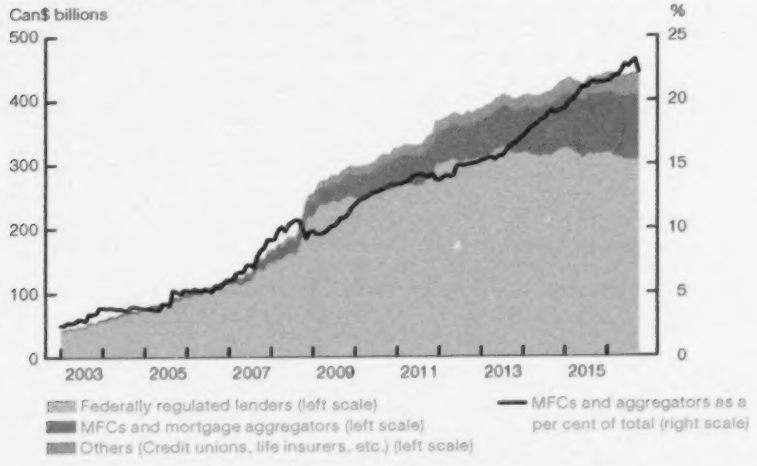
afterward, through portfolio insurance. Similar to those of other lenders that use government-backed mortgage insurance, the underwriting practices of MFCs are subject to federal requirements that limit the credit risk assumed by the taxpayer. These requirements are discussed in more detail later in the report, where we review the influence of guidelines issued by the Office of the Superintendent of Financial Institutions (OSFI).

The growth in public securitization programs has further enabled the success of MFCs.[8] The improved marketability of *National Housing Act* Mortgage-Backed Securities (NHA MBS) and Canada Mortgage Bonds (CMBs) relative to whole mortgage loans has played a key role in broadening the investor base of MFCs to include insurance companies, pension funds and other wealth managers. In particular, the timely payment guarantee of interest and principal by the Canada Mortgage and Housing Corporation (CMHC) removed payment risk for investors buying NHA MBS. Furthermore, the CMB program initiated in 2001 eliminated the remaining prepayment risk by converting monthly cash flows from NHA MBS into typical bond-like payments.

In addition, changes to the securitization programs in recent years have favoured small lenders such as MFCs. In 2013, CMHC introduced an annual cap for total NHA MBS issuance that was to be allocated equally among the program participants, regardless of their size (CMHC 2013). Since 2007, outstanding NHA MBS issued by either MFCs or mortgage aggregators[9] have increased from $15 billion, or 9 per cent of outstanding NHA MBS, to $100 billion, or 22 per cent of outstanding NHA MBS (Chart 2).

Chart 2: **Mortgage finance companies account for a growing share of outstanding NHA MBS**

Outstanding *National Housing Act* Mortgage-Backed Securities, by issuer type



Sources: Canada Mortgage and Housing Corporation and Bank of Canada calculations

Last observation: October 2016

8 Mortgage securitization is the process of converting illiquid mortgage assets into tradable securities. Public securitization represents a cost-effective supply of funding to mortgage lenders. For example, Mordel and Stephens (2015) estimate that the all-in funding cost advantage of Canada Mortgage Bonds versus the next-cheapest private alternative ranges from 28 to 51 basis points.

9 Mortgage aggregators act as an additional intermediary between MFCs and securitization investors and are particularly important for small MFCs that are unable to issue NHA MBS on their own. Of the five major aggregators in Canada, four are broker/dealer subsidiaries of the Big Six banks and the other, Merrill Lynch, is a broker/dealer subsidiary of a foreign bank.

Technological innovation in the origination and underwriting process as well as in the servicing of mortgages has also played an important role in the rise of MFCs. Underwriting, for example, has historically been entirely paper-based and involved many intermediaries. MFCs have improved on this process through document-management services, extensive automation, highly integrated paperless systems and easy-to-use web-based platforms for clients. Lenders that successfully implement these technologies are able to offer enhanced services to borrowers, which has also helped fuel growth in market share for these companies. In addition, the increased use of the Internet by consumers to compare mortgage products and interest rates is a key development. According to CMHC's Mortgage Consumer Survey 2016, nearly three-quarters of mortgage consumers research mortgage options and features online; of these, about half use rate-comparison websites. MFCs have been highly successful in this environment, since their pricing tends to be transparent and competitive.

The Role of MFCs in the Mortgage Market

In this section, we discuss the business models of MFCs in more detail, highlighting their relationship with mortgage brokers and banks, as well as the benefits they bring to mortgage borrowers. Understanding the MFC business model is also important for assessing their potential for contributing to financial system vulnerabilities.

The mortgage broker channel

When shopping for a mortgage contract in Canada, borrowers often try to negotiate a discount from the posted interest rate offered by the big banks. Lenders benefit from this process, since it allows them to earn a larger profit margin on those borrowers less able or willing to shop around, while still remaining competitive among borrowers that obtain quotes from multiple lenders. This feature of mortgage pricing is documented in Allen, Clark and Houde (2014), who show that a significant amount of the variation in mortgage rates in Canada is attributable to differences in the search efforts and bargaining power of borrowers.

Rather than independently negotiate the interest rate, borrowers can choose to hire a broker to search for the best rate on their behalf. Allen, Clark and Houde also demonstrate that among borrowers who use brokers, the dispersion in mortgage rates due to bargaining power is significantly diminished.

As a result, the Canadian mortgage market is roughly segmented between a broker channel, in which price-sensitive borrowers are able to get a competitive interest rate, and the direct bank channels, in which borrowers' ability and willingness to negotiate plays an important role. Importantly, other factors not related to mortgage rates could motivate borrowers to choose the direct bank channel. For example, borrowers may value the price discounts they receive on other financial products from having their services bundled at the same institution. They may also value the convenience of "one-stop banking" or may perceive the search costs as too high.

In addition to reducing the cost of obtaining multiple quotes, the broker channel also facilitates the participation of lenders such as MFCs that do not have branch networks. As a result, borrowers who hire brokers typically have access to a greater number of potential lenders—both traditional lenders and branchless institutions that operate exclusively in the broker channel.

Characteristics of broker channel borrowers

In regions where house prices are high relative to incomes, borrowers need larger mortgages and are more likely to have the amount of their loan constrained by underwriting guidelines or mortgage insurance rules that limit the size of mortgage payments and housing costs relative to income (debt-service requirements). These borrowers are thus highly price-sensitive and are more likely to use a mortgage broker to get the lowest possible rate. This is reflected in the composition of insured mortgages originated by MFCs, which have a greater proportion of borrowers with high loan-to-income and debt-service ratios than traditional lenders (**Box 1**).

Banks and MFCs: Co-operation and competition

An important development since the emergence of MFCs has been the declining direct participation of the major banks in the broker channel.[10] Instead, many of the major banks access the broker channel only indirectly by purchasing mortgages from MFCs or through outsourcing agreements with MFCs. Mortgage purchases typically take one of two forms: either the bank (or other buyer) pre-commits to purchasing a certain dollar amount of mortgages, which are funded by the purchaser when the transaction closes, or the mortgage is funded by the MFC at closing and is sold to a buyer at a later date. In the latter type of arrangement, mortgages need to be temporarily "warehoused" before being sold. In aggregate, about 6 per cent of outstanding MFC-underwritten mortgages are warehoused at a given time, although there is considerable heterogeneity among MFCs. These warehousing operations are financed primarily through asset-backed commercial paper (ABCP) conduits and lines of credit that MFCs typically source from multiple banks.[11]

Banks may choose to contract the origination and servicing of broker channel mortgages to MFCs for a number of reasons. First, as discussed earlier, many MFCs employ technologies that have significantly improved the efficiency of originating and servicing broker channel mortgages. These technologies improve the turnaround time on mortgage underwriting decisions and reduce costs. As a result, it may be more profitable for some banks to outsource these activities to MFCs than to replicate the processes themselves. Second, banks are able to scale up or down the amount of mortgages they purchase from MFCs more easily than they are able to scale their in-house operations. While this is advantageous for a bank that wants to reduce its exposure to the housing market in a downturn, it can represent a vulnerability for MFCs (this point is discussed below in the section on concentrated MFC funding sources). Third, banks can use MFCs to access borrowers in regions where they may have less of a presence.

MFCs and government-backed securitization programs

While direct purchases from banks account for about 40 per cent of MFC funding, the largest share of MFC-originated mortgages is funded through the NHA MBS and CMB programs (**Figure 1**). NHA MBS issued by MFCs and mortgage aggregators are sold either directly to investors or to Canada Housing Trust, which repackages them as CMBs. While some of these NHA MBS and CMBs are bought by the major banks for contingent

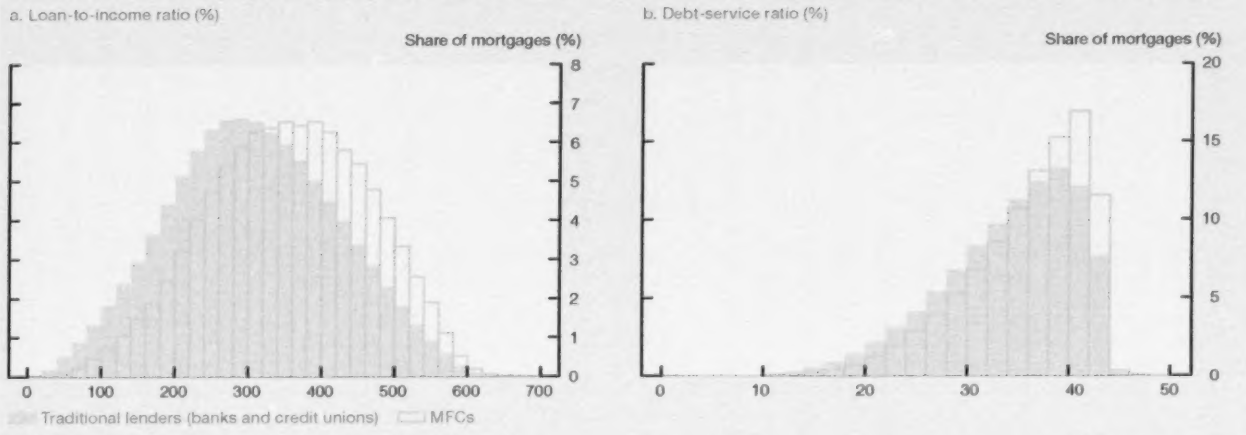
10 In the past decade, the Bank of Montreal (2007), HSBC (2010) and CIBC (2012) have exited or significantly reduced their presence in the broker channel. The Royal Bank of Canada has not participated in the broker channel for more than 10 years.

11 MFCs use ABCP securitization vehicles administered by the major banks as a flexible funding source for the short-term warehousing of mortgages. Compared with NHA MBS and CMBs, ABCP funding is relatively expensive, since it requires the MFC to post cash collateral as a means of credit enhancement and to pay standby fees on unused portions of committed facilities.

Box 1

Insured Mortgages Underwritten by MFCs Tend to Have Higher Loan-to-Income and Debt-Service Ratios

Chart 1-A: Characteristics of high-ratio insured mortgage originations by mortgage finance companies, 2013Q1–2016Q3



Sources: Department of Finance Canada and Bank of Canada

Last observation: 2016Q3

Table 1-A provides a comparison of the characteristics of the median mortgage borrower at mortgage finance companies (MFCs) with those of borrowers at traditional lenders (i.e., banks and credit unions). The comparison is based on high loan-to-value mortgages originated over the period from the first quarter of 2013 to the third quarter of 2016.[1]

On the one hand, the arrears rates of mortgages issued at MFCs tend to be notably lower than those of traditional lenders.[2] MFCs also lend to borrowers with higher incomes, which is often a good predictor of job stability. On the other hand, compared with mortgages originated at traditional lenders, MFC-underwritten mortgage loans tend to be larger, and the associated debt-service costs higher, relative to the borrowers' income.

Furthermore, as shown in Chart 1-A, insured mortgages underwritten by MFCs are more likely to have particularly high loan-to-income and debt-service ratios relative to traditional lenders. The share of MFC-originated mortgages with a loan-to-income ratio greater than 450 per cent or a total debt-service ratio greater than 42 per cent is 29 per cent, compared with 18 per cent for traditional lenders.[3]

These findings can be partly accounted for by differences in the geographical distribution of high-ratio insured mortgages. Almost one-quarter of MFC originations, 22 per cent, were in Vancouver or Toronto, markets where average loan-to-income and debt-service ratios are higher, compared with 12 per cent for traditional lenders. However, even within Vancouver and Toronto, MFC-originated mortgages are more likely to have high loan-to-income and debt-service ratios.[4]

Table 1-A: Characteristics of median mortgage borrowers
2013Q1–2016Q3

	Traditional lenders[a]	Mortgage finance companies
Credit score	739	742
90-day arrears rate[b] (%)	0.28	0.14
Household income (annual)	$80,912	$84,404
Loan-to-income ratio (%)	304	357
Total debt-service ratio (%)	35.3	37.2

a. Banks and credit unions

b. Based on mortgages in pools of *National Housing Act* Mortgage-Backed Securities as of 2015Q4

Sources: Department of Finance Canada, Canada Mortgage and Housing Corporation and Bank of Canada calculations

1 The data set covers all high-ratio mortgage originations (with a loan-to-value ratio greater than 80 per cent) insured by Genworth, Canada Mortgage and Housing Corporation, and Canada Guarantee.

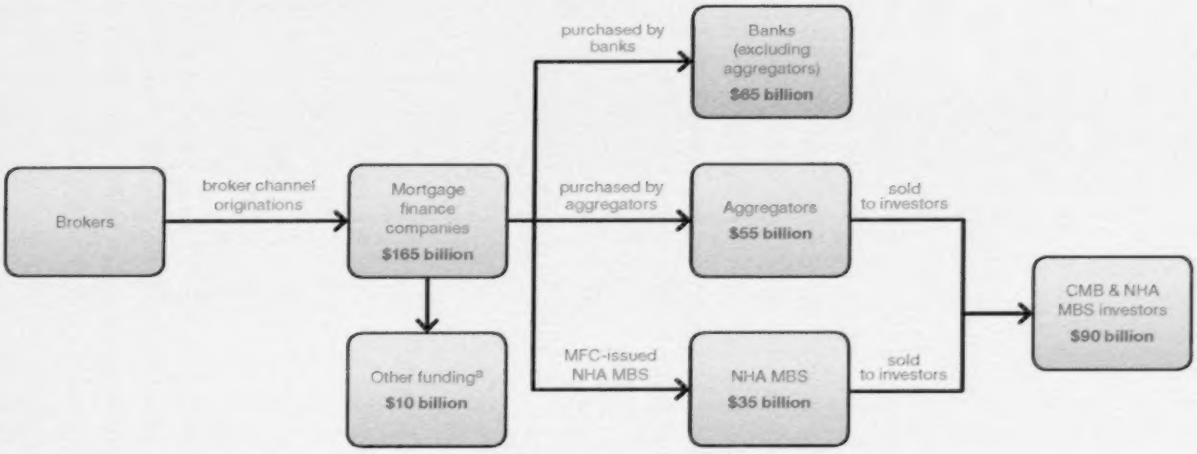
2 Arrears rates are an indicator of financial stress rather than of vulnerabilities. See the June 2016 Bank of Canada *Financial System Review*, page 11, for further discussion.

3 The loan-to-income ratio is a useful through-the-cycle measure for assessing the vulnerability of indebted households. It is particularly useful when interest rates are at historical lows and house prices are at historical highs. A higher ratio is associated with an increased likelihood of a household encountering financial distress, leading to arrears in debt payment obligations.

4 The share of MFC-originated mortgages in Vancouver and Toronto with high loan-to-income or debt-service ratios is 44 per cent, compared with 38 per cent for traditional lenders. To identify the boundaries of each city, the census metropolitan area defined by Statistics Canada is used.

Figure 1: Funding of mortgages underwritten by mortgage finance companies

Estimated funding sources as of 2015Q4 (arrows indicate flow of mortgages)



a. Other funding includes asset-backed commercial paper, credit lines from banks and MFC shareholders' equity.

Sources: MFC reports, Standard & Poor's, DBRS, Canada Mortgage and Housing Corporation, and Bank of Canada calculations

liquidity purposes, the majority are purchased by a broad range of non-bank investors, including pension funds, wealth managers and insurance companies. For example, in 2015, non-bank investors accounted for approximately three-quarters of CMB purchases.[12] Hence, a material part of MFC funding activities is conducted independently of banks.

Overall, the nature of the relationship between banks and MFCs is both cooperative and competitive. On the one hand, MFCs serve as an extension of the major banks that have chosen to "outsource" some mortgage-lending services that MFCs can provide more efficiently. In addition, some MFC operations rely on lines of credit from the big banks. On the other hand, because of the availability of low-cost funding through government-backed securitization, MFCs are able to finance mortgages independently of banks and contribute positively to the level of competition in the mortgage market.

However, as a result of their reliance on government-sponsored mortgage insurance and securitization programs, MFCs are relatively more vulnerable than traditional lenders to certain changes in government policy. In particular, a reduction in the availability of these programs or increased fees would have a more profound effect on MFCs than on traditional lenders. This was evident with the policy changes announced by the federal government in early October (**Box 2**).[13]

MFCs and OSFI's underwriting guidelines

With the growth of MFCs, a larger share of mortgage underwriting is taking place at institutions that are not directly subject to prudential regulation or supervision. However, since the majority of mortgages underwritten by

12 See "Three Pillars of the Canada Mortgage Bond Program," CMHC, 15 August 2016, available at www.cmhc-schl.gc.ca/en/hoficlincl/in/camobo/upload/canada-mortgage-bonds-fact-sheet-aug-15-2016.pdf.

13 Other recent changes to government programs include an increase in guarantee fees for the NHA MBS and CMB programs and new rules that preclude insured mortgages from being placed in non-CMHC securitizations, such as ABCP conduits (both effective as of July 2016).

Box 2

Impact of Recent Changes to Mortgage Insurance Rules

In October 2016, Canadian authorities announced changes to mortgage insurance rules designed to address high levels of household indebtedness and support the long-term stability of the housing market.[1] Although not targeted at mortgage finance companies (MFCs) or any other lender in particular, these changes will affect MFCs and smaller banks more than traditional lenders.

Effective 17 October 2016, borrowers of high-ratio insured mortgages with five-year fixed terms or longer must qualify for mortgage insurance at an interest rate that is the greater of their contract mortgage rate or the Bank of Canada's conventional five-year fixed posted rate. All else being equal, 43 per cent of high-ratio insured mortgages originated by MFCs over the period from the fourth quarter of 2015 to the third quarter of 2016 would not have qualified under the new rules, compared with 27 per cent of mortgages originated by traditional lenders.

Effective 30 November 2016, mortgage loans that lenders insure using portfolio insurance and other discretionary insurance for mortgages with low loan-to-value ratios must meet the eligibility criteria that previously applied only to high-ratio insured mortgages. In addition, refinanced mortgages will no longer be eligible for portfolio insurance. These changes have many dimensions that could affect MFC business. For example, the requirement that all portfolio-insured mortgages be amortized over 25 years or less would have affected 59 per cent of portfolio-insured MFC loans over the past year, compared with 38 per cent for traditional lenders.

Furthermore, proposed changes to include some level of lender risk sharing in the mortgage insurance framework could also disproportionately affect MFCs. While traditional lenders are already experienced in managing mortgage default risk and could adapt to risk sharing relatively easily, MFCs would need to make significant adjustments to their business model to accommodate a risk-sharing arrangement. Ultimately, the impact of risk sharing on MFCs would depend on the structure of the risk-sharing arrangement and how market participants react.

1 For more details, see Department of Finance Canada (2016).

MFCs end up insured and either securitized through the NHA MBS and/or CMB programs or sold to federally regulated lenders, they are subject to OSFI's B-20 and B-21 guidelines.[14] These guidelines require federally regulated institutions to meet high standards for prudent underwriting practices and require the same standards for mortgages purchased from MFCs.

Moreover, OSFI has recently updated its expectations regarding residential mortgage underwriting and mortgage insurance operations.[15] OSFI will place an even greater emphasis on confirming that federally regulated financial institutions conduct prudent mortgage underwriting and that their internal controls and risk-management practices are sound and take into account market developments. More specifically, OSFI will be enhancing its supervisory scrutiny around the verification of borrowers' income and employment, due diligence on non-conforming loans, stress tests of borrowers' resilience to adverse shocks, and property appraisals. In addition, OSFI expects federally regulated lenders and mortgage insurers to regularly verify that there is a strong alignment between their stated risk appetite and their actual mortgage and mortgage insurance underwriting and risk-management practices.

14 As a result, almost all MFC activity is considered to be part of the regulated sector and is thus excluded from the Bank's measure of shadow banking. See Chang et al. in this issue. Summaries of the guidelines are available on OSFI's website: B-20: www.osfi-bsif.gc.ca/eng/fi-if/rg-ro/gdn-ort/gl-ld/pages/b20.aspx; B-21: www.osfi-bsif.gc.ca/eng/fi-if/rg-ro/gdn-ort/gl-ld/pages/b21_let.aspx.

15 See the open letter from OSFI to federally regulated financial institutions (July 2016), available at www.osfi-bsif.gc.ca/Eng/Docs/rfmrm.pdf.

MFC profitability depends on a healthy mortgage market

In the current environment of strong house price growth and mortgage activity, MFCs have been highly profitable. In 2015, each of the three largest MFCs earned a return on equity of more than 20 per cent. However, as monoline businesses, their revenue sources are highly concentrated. Over 2014 and 2015, about 55 per cent of the revenues of the three largest MFCs was attributable to the sale of mortgages (net of fees paid to brokers) or spreads earned on securitized mortgages. A further 30 per cent of revenues was generated from the ongoing servicing and administration of these mortgages. This revenue is accrued slowly over the term of a mortgage and provides stability to MFC income, which would otherwise depend almost entirely on origination volumes. The remaining 15 per cent of MFC revenues arises from investment income and other sources.

Financial System Vulnerabilities Associated with MFCs

The larger role of MFCs in the mortgage market has brought benefits to mortgage borrowers through increased competition, but it also has the potential to increase certain financial system vulnerabilities. In this section, we discuss channels through which the greater importance of MFCs could exacerbate the impact of a severe economic and housing downturn.[16]

Because of the nature of their business models, MFCs can be more vulnerable to financial distress than traditional lenders in the event of such a downturn. In particular, relative to traditional lenders, MFCs (i) lend disproportionately more to financially stretched borrowers, (ii) have lower levels of capital and contingent liquidity, and (iii) have more highly concentrated funding sources.

MFC mortgages are more concentrated among financially stretched borrowers

As discussed in **Box 1**, MFCs tend to underwrite disproportionately more mortgages with higher loan-to-income and debt-service ratios. In a severe economic and housing downturn, these already financially stretched borrowers are at higher risk of defaulting or being forced to sell their houses. However, since MFCs do not retain the risk associated with most of the mortgages they underwrite, the losses will fall primarily on the mortgage insurers that do business with MFCs. Nevertheless, the performance of an MFC's mortgages remains important, since it can affect the MFC's access to funding and potentially strain its limited capital and contingent liquidity.

MFCs have low levels of capital and contingent liquidity

Another implication of MFCs' "originate-to-sell" business model is their low levels of capital and contingent liquidity relative to traditional lenders. MFCs typically have in the order of 40–90 cents of capital for every $100 of mortgages they have underwritten. Since a vast majority of MFC-underwritten mortgages are insured and a relatively small proportion of the mortgages are kept on MFC balance sheets, this strategy has been successful in the current environment of historically low default rates.

Low levels of capital and contingent liquidity could be more problematic, however, in a severe economic and housing market downturn. In particular, issuers of NHA MBS are responsible for paying amounts due to investors

16 For a detailed discussion of this risk scenario, see Risk 1 in the June 2016 Bank of Canada *Financial System Review*.

whether or not the issuers receive timely payments from borrowers. To protect the program against lender defaults, CMHC subjects NHA MBS issuers to a minimum net worth requirement equal to 2 per cent of the aggregate principal of NHA MBS outstanding. Nevertheless, the simultaneous delinquency of many mortgages could place significant strain on the liquid resources of MFCs while insurance claims are being processed. Moreover, MFCs may be challenged to ramp up servicing capacity to deal with higher arrears rates and borrower workouts in a severe downturn.

As well, mortgage insurers could become more vigilant in processing claims during periods of heightened mortgage defaults, leading to longer processing times that could further strain the liquid resources of MFCs. MFC capital could also be constrained should insurers reject claims at a higher rate, since purchase agreements between banks and MFCs typically allow the bank to put mortgages back to the MFC in cases where the insurance claim is rejected due to deficiencies in the underwriting. For example, in a severe but plausible economic and housing downturn, a rise in the rate at which insurance claims are rejected, from under 1 per cent today to 5 per cent, could result in losses over a three-year period that are equivalent to about 20 per cent of MFC capital.[17]

Furthermore, MFCs have some exposure to private mortgage insurers. While insurance coverage provided by CMHC has the full backing of the federal government, private insurers carry only a 90 per cent federal guarantee. As a result, MFCs could face significant losses if one of the private insurers defaulted and couldn't pay claims. Although the capital framework of banks requires them to hold capital against this possibility, MFCs have no such requirement.

MFCs have more highly concentrated funding sources

While traditional lenders fund mortgages through multiple sources—primarily retail deposits and wholesale funding but also through public securitization and covered bonds—MFCs are highly dependent on two sources only: funding from banks and public securitization programs.

As noted earlier, banks purchase mortgages from MFCs in part because of the relative ease with which these purchases can be scaled up or down. During periods of economic and housing market distress, banks would have the incentive to reduce purchases from MFCs to quickly reduce their exposure to housing markets while limiting the impact on customer relationships. Moreover, banks may demand a higher interest rate on credit lines extended to MFCs or may even curtail these exposures.[18] It could thus become more costly for MFCs to finance on-balance-sheet mortgages or otherwise fund their operations.

In addition, NHA MBS issuers are required to keep the 90-day delinquency rate in their mortgage pools below 1 per cent. If delinquencies exceed this amount, issuers can lose access to new NHA MBS guarantees. Because MFC insured-mortgage activities are more concentrated than those of traditional lenders in regions with high loan-to-income and debt-service ratios, it's more likely that their mortgage pools will reach the 1 per cent threshold in a downturn. Losing access to NHA MBS would be a significant problem

17 The mortgage loss rate used in this calculation is equivalent to 150 per cent of the average national loss rate in the Canadian stress scenario under the 2013 International Monetary Fund Financial Sector Assessment Program (FSAP) (IMF 2014).The markup over the FSAP loss rate reflects MFCs' tendency to underwrite disproportionately more mortgages with higher loan-to-income and debt-service ratios and their greater concentrations in regions where concern about a potential downturn in house prices is greatest.

18 See Ahnert (forthcoming), which discusses a generalized case of rollover risk.

for most MFCs and would send a negative signal to other institutions that may also cut back on mortgage purchases from the MFC or other institutions seen as having a similar risk profile.

Financial distress at a large MFC could exacerbate the impact of a housing market downturn

The failure of a large MFC or its inability to fund new loans would be highly disruptive for the mortgage market and could amplify the impact of a severe downturn in the economy or in house prices.

MFCs have a large footprint in the securitization market: NHA MBS issued directly by MFCs or by aggregators account for more than one-quarter of the value of outstanding residential mortgage securitizations. While holders of NHA MBS are protected from the default risk of the underlying mortgages, uncertainty around monthly payments remains, given the potential for early repayments of principal—including liquidations due to borrower default. A disproportionate rise in defaults among MFCs could reduce investor demand for these instruments, raising the funding costs for all NHA MBS issuers. Furthermore, investors may treat NHA MBS issued by banks and those issued by MFCs differently, adversely affecting the liquidity positions of institutions holding these securities.

In addition, MFCs that lost access to their funding sources would likely be unable to fund mortgages coming up for renewal. The orphaned mortgage borrowers would have to seek out new lenders, which could be challenging in a stressed environment, as traditional lenders would be looking to reduce their exposure to housing markets and conserve their liquid resources. These borrowers could be forced to renew at higher interest rates or sell their house at a discount, which could have a negative feedback effect on already weakened housing markets.

Finally, the failure of a large MFC could be disruptive for banks that have become more interconnected with and reliant on MFCs for mortgage origination, underwriting and servicing. While the overall share of banks' mortgages underwritten and serviced by MFCs was only about 7 per cent in 2015, significant heterogeneity existed across institutions. Some large banks have a material exposure to single MFCs for originating and servicing mortgages. As well, a number of smaller banks have become highly reliant on services provided by MFCs and may not have the capacity to fill in the gap quickly. Should a large MFC be unable to underwrite new loans, some segments of the mortgage market may see the availability of credit reduced. Moreover, any interruption of mortgage servicing during a housing market downturn could lead to security on defaulted mortgages not being enforced in a timely manner, resulting in greater losses to lenders.

Conclusion

Spurred by both government policies designed to increase competition and advances in technology, the mortgage market has changed over the past decade, with MFCs becoming significant players. Mortgage borrowers have benefited from the heightened competition brought about by MFCs through lower rates and an increased availability of credit, but these benefits have been accompanied by an increase in financial system vulnerabilities.

Because of MFCs' reliance on mortgage brokers for originations, the pool of mortgages they underwrite contains a greater proportion of loans with high loan-to-income and high debt-service ratios than those of traditional

lenders. In a severe economic and housing downturn, these borrowers are at greater risk of defaulting or being forced to sell their houses. Although mortgage insurance would protect MFCs from incurring losses on defaulted loans, the performance of MFC-originated mortgages remains important to them, since it can affect their access to funding and potentially strain their limited capital and contingent liquidity. The failure of a large MFC or its inability to fund new loans would be disruptive for the mortgage market and could amplify the impact of a severe economic and housing market downturn.

Nevertheless, the systemic risk associated with MFCs is largely mitigated, since almost all of the credit risk associated with their activities resides with federally regulated mortgage insurers and lenders, which are required by OSFI to scrutinize the underwriting practices of MFCs. Stress tests such as the International Monetary Fund's 2013 Financial Sector Assessment Program for Canada have demonstrated the resilience of the financial system to large but plausible adverse shocks. Furthermore, recent stress tests conducted by CMHC indicate that the mortgage insurer has sufficient capital to handle an extreme but plausible house price correction.[19] Nonetheless, because MFCs are not prudentially regulated, ongoing monitoring of their business models and the impact of their activities on financial system vulnerabilities is necessary as the mortgage marketplace evolves.

19 Information on CMHC stress testing is available at www.cmhc-schl.gc.ca/en/corp/nero/jufa/jufa_036.cfm.

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Toward More Resilient Markets: Over-the-Counter Derivatives Reform in Canada

Michael Mueller and André Usche[1]

- Over-the-counter derivatives (OTCD) markets are important for the financial system because they facilitate the transfer and management of risk. However, during the 2007–09 financial crisis they propagated and amplified shocks. In response, leaders of the G20 countries agreed to make reforms to these markets, and Canadian authorities are implementing the reforms in a manner appropriate for the Canadian market.
- Implementation of the reforms is leading to improvements in risk-management practices. For example, the required central clearing of standardized trades and margin requirements for non-centrally cleared derivatives are reducing counterparty credit risk and, hence, the risk of contagion. As well, mandatory trade reporting has increased regulatory transparency.
- Despite these benefits, the reforms could lead to higher market concentration and fragmentation and could increase the cost of accessing OTCD markets, especially for smaller participants.
- As the implementation of the OTCD reforms nears completion, it is critical that authorities evaluate the effect on market functioning and make further refinements, if needed.

Introduction

Over-the-counter derivatives (OTCD) markets are an important component of the Canadian and global financial systems because they allow risks to be efficiently transferred and managed (italicized terms are defined in **Table 1**). OTCD markets facilitate access to cross-border funding and allow market participants to take on and manage exposures. For example, OTCD contracts enable buy-side institutions such as pension funds to enhance their investment returns.

In Canada, the markets for OTC *interest rate* and *foreign exchange* (FX) *derivatives* are of systemic importance because of their size and centrality, as well as the risk exposures they create and help manage for market participants

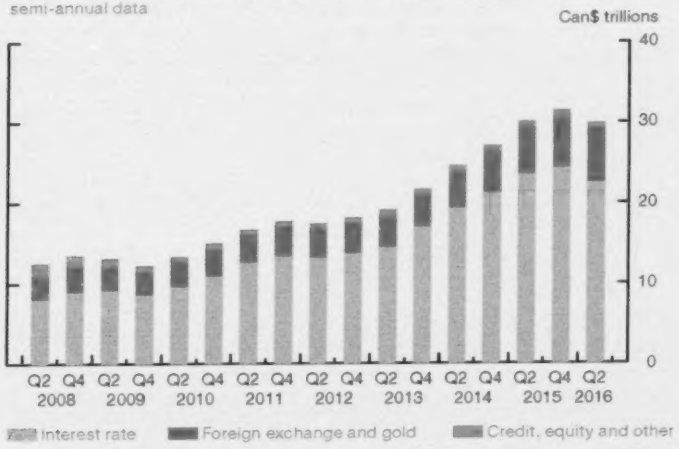
1 We would like to thank the Ontario Securities Commission and, in particular, Shaun Olson and Yani Wu for compiling and sharing aggregate OTCD trade repository data. We also thank James Pinnington for his research assistance and help with the charts in this article.

Table 1: Selected derivatives terminology

Key term	Definition
Over-the-counter derivative (OTCD)	A derivative that is not traded on a formal exchange but is directly negotiated between the counterparties. OTCDs are often intermediated by dealers who make markets in these instruments. In Canada, the Big Six banks are large derivatives dealers; the five biggest are also registered swap dealers in the United States. The term *swap* is often used as a synonym for an OTCD.
Central counterparty (CCP)	A clearinghouse that stands between clearing participants. The CCP becomes the counterparty to every transaction between the clearing participants and thereby manages counterparty credit risk.
Interest rate derivative	A derivative whose payment flows are tied to levels of interest rates. The *interest rate swap*, in its simplest form, exchanges a fixed-rate for a floating-rate payment. Interest rate derivatives are used to manage duration and to hedge interest rate risk.
Foreign exchange (FX) derivative	A derivative whose payments are linked to the exchange rates between different currencies. The *FX forward* promises to exchange one currency for another at a predetermined exchange rate in the future. The *FX swap* is an exchange of currencies at one date that is reversed at a later date, again at predetermined exchange rates. It is a popular tool for companies looking to access funding in foreign currencies.
Notional amount	The *face value* of the derivative contract. The notional amount is not usually exchanged but is used to calculate payments owed by counterparties.
Trade repository (TR)	An infrastructure that collects, stores and disseminates records of OTCD transactions.

Chart 1: Interest rate and foreign exchange derivatives are the largest component of Canadian over-the-counter derivatives markets

Notional value of OTCD held by Canadian banks, by underlying asset class, semi-annual data



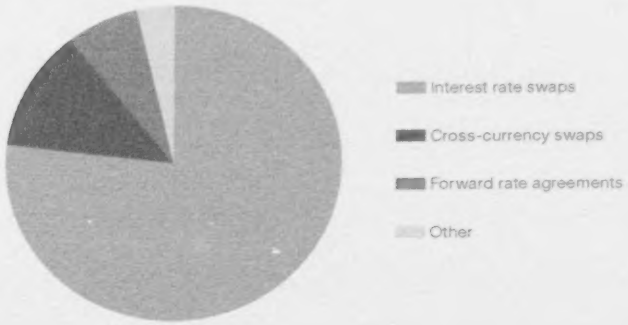
Sources: Regulatory filings of Canadian banks

Last observation: 2016Q2

(Chande, Labelle and Tuer 2010). Since 2008, the total size of the Canadian OTCD market has more than doubled, driven mainly by growth in interest rate derivatives. Measured in terms of outstanding *notional amounts,* the interest rate derivatives market is the largest segment, at about $23 trillion, followed by the FX derivatives market, at about $7 trillion as of the second quarter of 2016 (**Chart 1**). Credit, equity and other derivatives constitute a much smaller segment. The most widely used OTC interest rate derivative is the interest rate swap, while the most widely used OTC FX derivatives are forwards and swaps

Chart 2: Interest rate swaps are the most common interest rate derivatives

Notional amount of interest rate derivatives outstanding, by derivative type

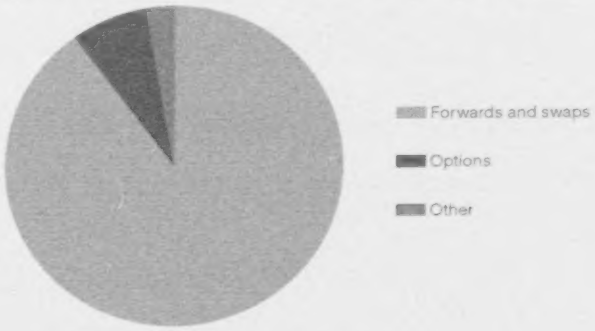


Source: Ontario Securities Commission

Last observation: 2016Q2

Chart 3: Forwards and swaps are the most widely used foreign exchange derivatives

Notional amount of foreign exchange derivatives outstanding, by derivative type



Source: Ontario Securities Commission

Last observation: 2016Q2

(Chart 2 and Chart 3).[2, 3] A disruption in one of these markets could affect the financial system and the broader economy by impeding access to funding and the hedging of risks for financial institutions. In extreme cases, counterparty defaults could be triggered.

The Canadian OTCD market is globally connected. Chart 4 shows the location of counterparties to OTCD trades reported in Canada: Canadian entities trade heavily with counterparties in the United States and the European Union, especially in the United Kingdom, Germany and France.

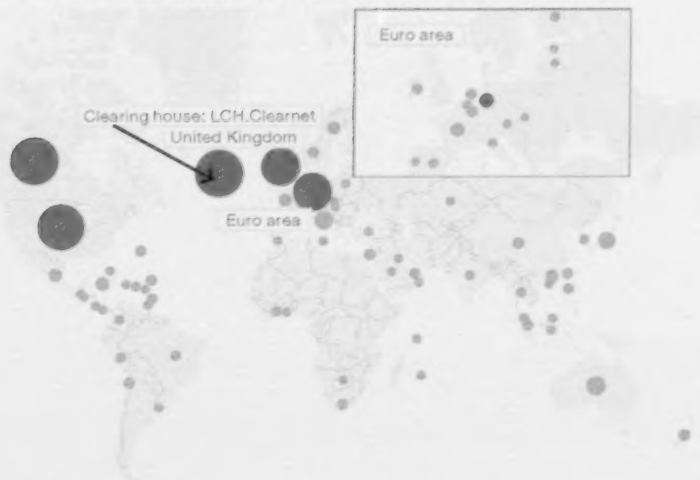
OTCD markets have the potential to transmit and amplify shocks to the financial system, as they did during the 2007–09 global financial crisis. When mortgage defaults began to mount in the United States in 2008, financial

2 A number of charts in this report are compiled using trade repository data reported pursuant to Ontario reporting rules. These data capture a large share of the Canadian market and include both centrally cleared and bilateral transactions. Chart 2 and Chart 3 exclude over-reported transactions where the clearing house is the non-reporting counterparty. Double counting may exist in which cleared transactions between Ontario counterparties were novated into two new transactions.

3 Chart 3 does not distinguish between FX swaps and forwards because the swap legs may be reported as two forwards.

Chart 4: Canadian institutions trade in a global OTCD market

Notional amount outstanding, by location of Canadian entities' counterparties



Note: This chart is based on open position data in interest rate, FX, equity and credit asset classes as at 30 June 2016. "Canadian entities" means entities headquartered in Canada. The circles denote aggregate notional amounts; notionals in excess of $1 trillion are shown in red.

Source: Ontario Securities Commission

Last observation: 30 June 2016

institutions around the world began suffering losses from exposures to derivatives that referenced mortgage securitizations.[4] These losses, coupled with widespread uncertainty around the size of institutions' exposures to derivatives, raised concerns about the ability of counterparties to meet their other obligations. This uncertainty led to a reluctance to provide funding and, over the course of 2008, contributed to the failure (or near-failure) of Bear Stearns, Lehman Brothers and American International Group (AIG). In addition, the opaque nature of OTCD markets meant that regulators had insufficient information to respond to and resolve the circumstances that precipitated the crisis (Duffie 2011).

In response, at the September 2009 Pittsburgh Summit the leaders of the G20 countries committed to reform OTCD markets. The reform agenda had three fundamental goals: improve the transparency of the OTCD market, mitigate systemic risk and protect against market abuse (G20 2009). To achieve these goals, the G20 set out to strengthen the infrastructure for OTCD markets, including trade repositories, central counterparties and trading platforms. The G20 also mandated higher capital requirements for non-centrally cleared OTCDs and, in 2011, required that margins be used to secure these transactions.

This report follows up on Wilkins and Woodman (2010) and OTC Derivatives Working Group (2010). It provides an overview of the goals of the G20 reforms and their implementation in Canada and reviews the effects of the reforms on OTCD markets.

4 These derivatives include credit default swaps, which were often not secured with collateral.

Implementing OTCD Reforms in Canada

Internationally, no jurisdiction has completely implemented all the reform requirements to date. In Canada, implementation progress in most reform areas is in line with that of jurisdictions hosting the largest OTCD markets.[5]

Implementing the OTCD reforms in Canada touches on many different parts of the financial system and is carried out through close co-operation between federal and provincial authorities.[6] The approach adopted by regulatory authorities takes into account the Canadian market's small size on a global scale, its liquidity characteristics, the prevalence of interest rate and FX derivatives, and market participants' reliance on cross-border transactions. These market characteristics underpin the decision made by Canadian authorities to allow the existing global infrastructure to be used for central clearing and trade reporting, judging that such use would be more efficient and less costly than building a domestic infrastructure. However, using foreign entities also presents some challenges. For example, to be effective, the cross-border supervision of global infrastructures requires close collaboration across jurisdictions (Chande et al. 2012).

Table 2 summarizes the goals of the G20 reform agenda and outlines Canada's progress in each area. Consistent with international standards and the approaches of other jurisdictions, FX derivatives are mostly beyond the scope of the clearing and margining requirements, despite the size of those markets and their global importance. One reason for this exclusion is that payments related to FX derivatives transactions are subject to a high degree of settlement risk that cannot yet be fully managed by a *central counterparty* (CCP). Nevertheless, many of these transactions currently settle through CLS Bank, which mitigates settlement risk.[7]

Effects of the Reforms to Date

The G20 reforms were designed to improve the resilience of OTCD markets; they also raise the costs of risk transfer and other financial services (BIS 2013). In this section, we discuss the intended benefits of the reforms for the financial system and identify the impact of the regulatory changes to date. Many of these changes have only recently come into effect, and not all market participants have completely adjusted to the new requirements. Assessing the full impact on the market will therefore take more time.

Trade reporting and risk assessment

Trade repository (TR) reporting allows public sector authorities to monitor vulnerabilities and conduct in OTCD markets and, when necessary, to take preventive action through policy adjustments such as changes to the scope of derivatives regulation. Although the analysis of TR data is still at an early stage, Canadian securities regulators are already using it to enhance their understanding of OTCD markets. TR data analysis was used as an input to

5 Progress in individual commitment areas varies across jurisdictions; for detailed information, see the most recent Financial Stability Board progress report (FSB 2016).

6 Canadian authorities coordinate the implementation of OTCD reforms through the interagency Canadian OTC Derivatives Working Group (OTCD WG), which is chaired by the Bank of Canada. Authorities represented on the OTCD WG include the Office of the Superintendent of Financial Institutions, the Department of Finance Canada, the Ontario Securities Commission, the Quebec Autorité des marchés financiers, the British Columbia Securities Commission and the Alberta Securities Commission.

7 CLS Bank is a global payment system for the settlement of foreign exchange transactions, including those involving the Canadian dollar. It is supervised by the US Federal Reserve Board and is overseen by the CLS Oversight Committee, which is composed of central banks, including the Bank of Canada, whose currencies are covered by the CLS arrangements.

Table 2: Canada's progress in implementing the G20 reforms

	Reform goals	Implementation by Canada	Status
Trade reporting	1. Allow regulators to ▪ monitor the buildup of risks ▪ act to mitigate these risks ▪ enforce market conduct regulations 2. Make OTCD markets more transparent to authorities, market participants and the public	▪ All over-the-counter derivatives transactions (except certain commodity derivatives) need to be reported to a recognized trade repository (TR).[a] ▪ Three US-domiciled TRs are currently authorized by Canadian securities regulators to receive Canadian data.[b] ▪ Starting in early 2017, certain transactional data (including on price and size) will be made public within two days of a transaction.	COMPLETE
Capital	1. Increase banks' capital buffers against derivatives exposures 2. Create incentives for central clearing	▪ Basel III capital rules, which raise banks' capital requirements for OTCD exposures, have been in place since 2014. ▪ Bilateral transactions require more capital than centrally cleared transactions and are thus costlier.	COMPLETE
Central clearing	1. Reduce counterparty credit risk by subjecting standardized trades to a CCP's risk management, including netting, risk mutualization, margin requirements and standard default-management procedures 2. Reduce market complexity 3. Make OTCD markets more transparent	▪ The Office of the Superintendent of Financial Institutions (OSFI) expects federally regulated financial institutions to centrally clear standardized OTCD trades, when practicable.[c] ▪ Provincial securities regulators will have a clearing mandate in force in 2017 for certain interest rate derivatives denominated in Canadian dollars, US dollars, British pounds sterling and euros. The mandate is intended to apply to large derivatives participants as the most important contributors to systemic risk. ▪ Eight CCPs are currently authorized by provincial regulators to offer clearing services in Canada. The largest, LCH.Clearnet Limited's SwapClear Service, is designated by the Bank of Canada as systemically important and therefore subject to ongoing regulatory oversight.	NEARLY COMPLETE
Margining	1. Reduce counterparty credit risk through the exchange of collateral for uncleared trades 2. Create incentives for standardization and central clearing	▪ OSFI requires the mandatory exchange of collateral for trades not centrally cleared.[d] This requirement came into force on 1 September 2016 and is being phased in according to an internationally agreed timeline. ▪ In 2017, provincial securities regulators will put in place comparable rules for entities that are not federally regulated.	NEARLY COMPLETE
Platform trading	1. Increase pre-trade transparency 2. Improve regulatory oversight by moving trades to regulated platforms	▪ Canadian securities regulators have published a consultation paper describing options for implementing a platform trading mandate. ▪ An open question is whether the relatively small Canadian OTCD market is suitable for mandatory platform trading.	UNDER CONSIDERATION

a. As per Ontario Securities Commission, Autorité des marchés financiers and Manitoba Securities Commission Rule 91-507, Trade Repositories and Derivatives Data Reporting; Multilateral Instrument 96-101, Trade Repositories and Derivatives Data Reporting; and OSFI Guideline B-7: Derivatives Sound Practices

b. DTCC Data Repository (U.S.) LLC ("DDR"); ICE Trade Vault, LLC; and Chicago Mercantile Exchange Inc.

c. OSFI Guideline B-7: Derivatives Sound Practices

d. OSFI Guideline E-22: Margin Requirements for Non-Centrally Cleared Derivatives

the decision on which products and market participants should be subject to mandatory central clearing and margin requirements and how information should be publicly disseminated without identifying specific market participants. Other early assessments include the size and concentration of subsets of the OTCD market, the proportion of transactions with foreign counterparties and the interconnectedness of market participants. **Box 1** provides a more detailed description of the potential uses of TR data for systemic risk assessments.

Numerous challenges still need to be addressed, however, before trade reporting will achieve its full benefits. OTCDs are traded globally, and a full understanding of the market requires a global perspective. But, with more than 30 TRs currently receiving reports in various jurisdictions, data need to be shared and aggregated across TRs, either by individual authorities

Box 1

Using Trade Repository Data to Monitor Systemic Risks

Trade repositories (TRs) collect detailed transaction-level data on derivatives from market participants and can therefore provide a wealth of information on the use of over-the-counter derivatives (OTCD) contracts and on the structure of OTCD markets. This information can help authorities understand how OTCD markets can create, amplify and propagate financial shocks in ways that may create systemic risks. Once it has obtained access to TR data, the Bank of Canada can also use the data in its assessment of vulnerabilities and risks in the *Financial System Review*.

Table 1-A describes the types of characteristics authorities can examine using TR data to monitor and manage systemic risks in OTCD markets. Two examples of specific uses of TR data in systemic risk analysis are discussed below.

Concentration of exposures

Concentrated exposures of Canadian institutions to domestic and international entities are a potential source of systemic risk. The calculation of exposures should incorporate the value of the collateral that is exchanged between counterparties, which is currently not required to be reported to a TR. But it is possible to identify the relative size of the activities and the positions of market participants. Combined with an analysis of the role of various Canadian institutions in certain market segments, this type of analysis allows authorities to understand how concentration could affect the transmission of shocks through the financial system.

Concentration varies widely across asset classes: among interest rate derivatives, concentration is highest in forward rate agreements and interest rate swaps. For example, four counterparties constitute more than three-quarters of the market for forward rate agreements. Conversely, the FX derivatives market is generally less concentrated than the interest rate derivatives market. Across both interest rate and FX product categories, the Big Six banks are consistently among the largest counterparties.

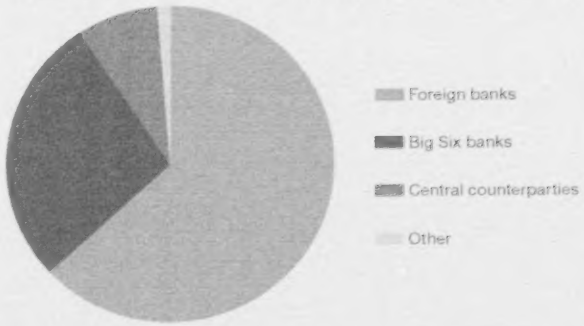
Interlinkages among Canadian financial institutions

While linkages among the domestic systemically important banks (the Big Six) are relatively well understood, only limited data exist to help us understand the interlinkages between the Big Six and other domestic institutions, including pension funds, life insurers and smaller banks, as well as foreign financial institutions.[1] TR data should assist authorities in mapping how shocks could be transmitted within or to the Canadian financial system and which entities can be viewed as key points for the transmission of shocks. For example, **Chart 1-A** indicates that Canadian pension funds trade mainly with foreign banks.[2] TR data can show the extent to which Canadian banks and pension funds are exposed to a specific foreign bank.

(continued...)

Chart 1-A: Canadian pension funds trade widely with foreign banks

Counterparties of domestic pension funds, by share of notional exposures



Source: Ontario Securities Commission — Last observation: 2016Q2

1 Data on certain end-users of derivatives, such as frequent corporate borrowers, are also limited.

2 Chart 1-A includes interest rate, FX, equity and credit asset classes. When a transaction is cleared, the original counterparties to the pension funds are unknown.

Table 1-A: Useful market characteristics for monitoring systemic risk

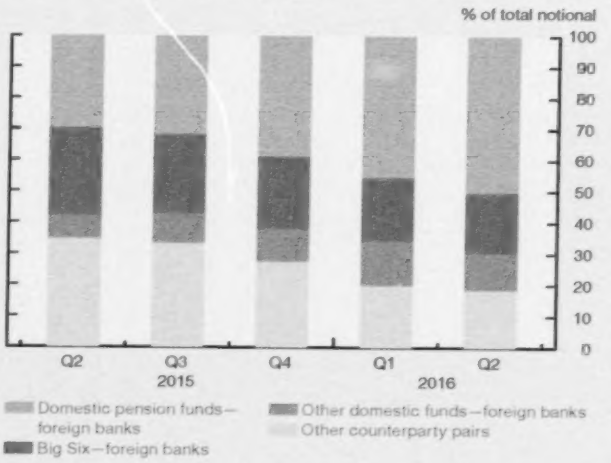
Characteristic	Description	Use in monitoring systemic risk
Size	• size of positions and exposures of financial institutions	• helps assess the possible severity of vulnerabilities
Concentration	• relative importance of individual or groups of financial institutions within a market segment	• identifies buildup of large volumes or positions and common exposures in defined populations
Interconnectedness	• the nature, scale and scope of obligations that arise among institutions	• describes the network of links across participants within a segment of the OTCD market and across different segments
Market structure	• analysis of liquidity provision and pricing of counterparty credit risk, and monitoring the well-functioning of trade and post-trade infrastructure	• determines how effectively risk is transferred and managed in the market

Box 1 (*continued*)

This type of analysis can also be done by asset class. **Chart 1-B** shows that, in Canada, credit derivative transactions between pension funds and foreign banks have been growing in relative terms.[3] These transactions now constitute the biggest share of the credit derivatives market, and a large percentage of credit derivatives are traded without the participation of Canadian banks. Conversely, interest rate and FX derivatives generally involve one of the Big Six banks.

Chart 1-B: Credit derivative transactions, by counterparties

Share of credit derivatives outstanding, by counterparty pair and notional amount



Source: Ontario Securities Commission

Last observation: 2016Q2

3 They have also grown in absolute terms.

or by a common international aggregation mechanism.[8] This has not yet been accomplished.[9] Legal barriers frequently prevent authorities from accessing TR data, both across borders and within jurisdictions.[10] In some jurisdictions, legal barriers also prohibit market participants from reporting complete transaction information, including counterparty identifiers.

In addition, there are multiple technical challenges in using data held in individual TRs and aggregating data across TRs. Rules, definitions of data fields and reporting standards can differ across jurisdictions and even across TRs in the same jurisdiction. As well, reported data are sometimes incomplete, inconsistent or inaccurate. For these reasons, tracing trades over their life cycle, identifying and removing duplicate reports, and disguising identities to satisfy confidentiality standards is proving to be difficult. Moreover, some important gaps in the data persist. For example, most jurisdictions do not require the reporting of information necessary for calculating exposures—specifically, pledged collateral and netting sets. The international regulatory community is working to resolve the legal and technical barriers so TR data can be fully used for assessments of vulnerabilities and risks.[11] Key initiatives to facilitate effective data aggregation include setting standards that will help improve data quality and harmonizing reporting requirements across jurisdictions. But even in a best-case scenario, fully addressing the outstanding issues will likely require an extended period of time and coordinated efforts by authorities, market participants and infrastructure providers.

8 For further information on sharing and assessing TR data across multiple jurisdictions, see CPSS-IOSCO (2013) and FSB (2014).

9 Provincial securities regulators can aggregate data reported under their respective rules across the three recognized TRs.

10 The US Congress removed the main barrier to foreign authorities' access to TR data from US legislation. Once the US Commodities Futures and Trading Commission has adopted these changes in their rules, Canadian federal authorities may gain access to Canadian TR data that is reported to authorized TRs in the United States.

11 For further information on the extent of reporting across jurisdictions, legal barriers and other challenges to reporting, see FSB (2015).

Improving transparency in the OTCD market also requires that information about traded derivatives be made available to the public, although there is no international consensus on the appropriate level of public transparency. Beginning in January 2017, public dissemination of information on transaction-level quantity and price details will enhance post-trade transparency across Canada.

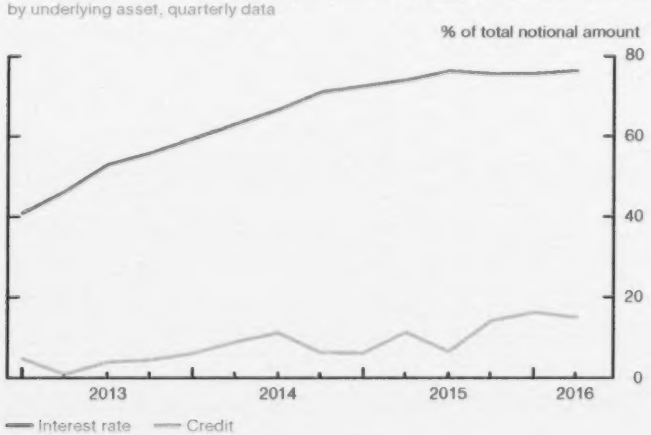
Counterparty credit risk management

The OTCD reforms improve the management of counterparty credit risk. This not only makes the market more resilient, but also helps to mitigate concerns around "too big to fail" by reducing the impact of the failure of one large market participant on others. Taken together, the reforms to clearing, capital and margin compel large financial entities to clear as many of their OTCD trades as possible. The stability of the financial system benefits from this move toward centrally cleared trades. Central clearing subjects trades to the risk-management frameworks of CCPs, simplifies the network of exposures, reduces exposures through netting, mutualizes default risk and provides an effective mechanism for managing defaults of market participants (Chande, Labelle and Tuer 2010).[12]

Over the past three years, Canadian banks have been clearing an increasing proportion of their OTCD trades, especially those in interest rate derivatives (**Chart 5**), which form the largest segment of the OTCD market. Approximately 80 per cent of these contracts (as measured by outstanding notional) are now cleared. Roughly 15 per cent of credit derivatives were cleared in Canada in the second quarter of 2016, while clearing in the other, less-standardized or less-liquid asset classes is negligible. Smaller market participants and those not subject to Basel III capital requirements have fewer incentives to centrally clear, but may choose to do so to take advantage of the risk reduction that clearing affords.

Chart 5: **Canadian banks' share of cleared interest rate and credit derivatives**

Cleared share of over-the-counter derivatives (OTCD) held by selected Canadian banks, by underlying asset, quarterly data



Note: Clearing of foreign exchange and gold OTCD is negligible.
Sources: Regulatory filings of Canadian banks
Last observation: 2016Q2

12 Pirrong (2014) points out that OTCD reform should not be evaluated in isolation and that attempts to make OTCD markets safer may simply redistribute risks elsewhere in the financial system.

Under the new regulatory regime in Canada, all but the smallest financial entities will have to collateralize trades that are not centrally cleared. Exchanging collateral for these bilateral trades reduces counterparty credit risk: the surviving counterparty can use the posted collateral to cover losses while replacing a defaulted trade. Protecting surviving counterparties from losses reduces the possibility that a default will cause wider stress. Furthermore, since bilateral transactions generally require more margin to be posted than similar cleared trades, the margin requirements for bilateral trades provide additional incentives for market participants to centrally clear OTCD transactions.

Increased central clearing is leading to risks being concentrated in a few global market infrastructures, as authorities expected when they designed the new regulatory regime. The Financial Stability Board (FSB) and international standard-setting bodies are coordinating joint work to address the concentration of risk in CCPs. The work focuses on measures that promote CCPs' resilience to clearing member failures (including margin requirements, default funds and liquidity resources) and on recovery planning and resolvability, as well as on understanding the interdependencies between CCPs and their participants.[13] The Bank of Canada is contributing to this work and also participates in the oversight college and crisis-management group for LCH.Clearnet (LCH), whose SwapClear service has been designated by the Bank as systemically important. LCH's oversight college is led by the Bank of England, which would be responsible for overseeing the implementation of LCH's recovery plan and—should it ever become necessary—for taking actions to resolve SwapClear. In addition, appropriate arrangements will be developed to support information sharing and coordination among authorities in a resolution event.

The application of margin to both cleared and bilateral OTCD transactions generally mitigates the risk of contagion and reduces systemic risk. But during times of stress, margin requirements can also lead to procyclicality, where an increased frequency of margin calls, coupled with falling collateral values, exacerbates market stress and may ultimately cause funding problems for market participants. One way to partially alleviate procyclicality is to apply through-the-cycle margining, which during normal times sets margin levels high enough that they do not need to be raised in times of stress.[14] Rules for both CCP and bilateral margins require that procyclicality be minimized.

The structure of OTCD markets

The reforms in OTCD markets are leading to noteworthy changes in market structure. The types of participants, the products they use and who they choose to trade with are all adapting to the new environment. Many of these changes are improving the resilience of the market, while also increasing the costs of participating in it. The extent of these cost increases and other negative consequences need to be carefully monitored.

Higher market concentration

Increased costs from higher capital and margin requirements, more demanding compliance regimes and high infrastructure expenditures make trading in OTCD markets more expensive and may increase the returns to scale. This may cause some dealers to exit the market or to cease offering

13 The workplan can be viewed at www.fsb.org/wp-content/uploads/Joint-CCP-Workplan-for-2015-For-Publication.pdf. A progress report is available at www.fsb.org/2015/09/progress-report-on-the-ccp-workplan.

14 The Bank has recently worked with the Canadian Derivatives Clearing Corporation to implement through-the-cycle margining.

certain services. The higher concentration of dealers in some segments as a result of such exits may lower market liquidity and make a failure of one of the remaining dealers more systemically important. Even in the presence of central clearing, a drop in the number of dealer clearing members would reduce the ability of CCPs to effectively handle a dealer default.

Greater product standardization

As intended, relatively higher costs for bilateral trades provide incentives for market participants to standardize contracts, thereby improving their liquidity and moving them to central clearing. Standardized contracts not only facilitate the use of centralized infrastructure, they also enable the market to be more transparent and increase opportunities for competition. At the same time, standardization makes it more expensive to tailor derivatives contracts to the individual needs of market participants, for example, to hedge specific exposures. Standardized OTCD contracts or listed derivatives can still be used as hedges, but a residual basis risk will remain.

Client clearing costs

A situation that illustrates how higher costs can lead to undesired effects is the challenge that smaller institutions have in accessing central clearing. Since they cannot directly access CCPs, these institutions must clear indirectly as a client of a clearing member. If client clearing is not cost-effective and widely available, the move to central clearing will be inhibited, or smaller market participants may be forced out of the market (Slive, Wilkins and Witmer 2011). The Basel III leverage ratio can currently increase the cost of providing client clearing services. In some cases, Basel III treats the client's collateral as an exposure and requires the clearing member to hold capital against it. In response, clearing members are reluctant to widely offer clearing services. To alleviate these effects, the Basel Committee on Banking Supervision has included this issue in its ongoing consultation on the Basel III leverage ratio.

Entities that face difficulty accessing client clearing are still able to trade bilaterally. However, the reforms also raise the costs of bilateral trades, and institutions may elect to simply not hedge certain exposures and instead retain those risks on their balance sheet.

Changes in market practice

The clearing and margining reforms and the associated rise in mandatory collateralization require significant changes in market practice. The timely exchange of margin for both cleared and bilateral trades raises the amount of collateral needed and the speed with which it must be mobilized. This makes it increasingly necessary for market participants to pre-fund collateral for OTCD or to hold the collateral at a custodian so that it can be easily moved. International CCPs introduce an additional complication for Canadian clearing members because these CCPs generally limit the amount of foreign collateral they accept. In turn, Canadian clearing members may have to transform collateral denominated in Canadian dollars into foreign-denominated collateral. This exposes Canadian clearing members to shocks in collateral markets denominated in foreign currencies.

Fragmentation caused by complex rules and inadequate harmonization

OTCD markets are largely global in nature, but the actual implementation of the reforms is carried out on a national level. Although significant efforts have been made to harmonize the rules and implementation timelines

across jurisdictions, differing approaches and the complexity of the issues have led to some cross-border conflicts regarding the rules of various jurisdictions. Recent examples are differences in the regulation of trading and clearing infrastructures in the European Union, the United States and certain Asian jurisdictions, or the fact that only three jurisdictions have implemented mandatory margin requirements in line with internationally agreed timelines. In some jurisdictions, regulators apply their rules to market participants in foreign jurisdictions, thereby adding an additional layer of regulation for these participants and potentially creating jurisdictional conflicts. Regulators can mitigate the negative effects by coordinating implementation timelines and recognizing the equivalence of each other's regulatory regimes in terms of outcomes.[15] In the absence of mutual recognition, disparities between the rules of different jurisdictions can contribute to regulatory uncertainty, reduce competition across dealers and fragment liquidity. This was evident when differences in trading rules for European and US electronic platforms led to a reported fragmentation of euro-denominated interest rate swaps.[16]

Costs of legal compliance for foreign clients of smaller jurisdictions

Even when the rules do not contradict each other, understanding differences across jurisdictions entails costly legal analysis, which may discourage foreign participation in markets—especially smaller ones. A market participant that has already incurred compliance costs in several jurisdictions may simply avoid trading with a Canadian counterparty (including its foreign branches) rather than invest in understanding and complying with Canadian rules. The pressure is therefore on the smaller jurisdictions to harmonize with the rules of the larger jurisdictions to avoid being excluded from the market. In Canada, where implementing the OTCD reforms is a joint federal-provincial responsibility, it is particularly important for the rules to be uniform and harmonized domestically to reduce regulatory overlap and compliance costs. As much as possible, provincial regulators are using national instruments to ensure that their rules are harmonized across the country.

Conclusion

OTCD reform implementation is nearing its completion in Canada. In addition to international coordination, implementing the reforms has necessitated coordination between Canadian federal and provincial regulators and among market regulators in all of Canada's provinces and territories. To round out the implementation process, it is important that regulators continue to harmonize their approaches both domestically and internationally and recognize each other's rules as equivalent when the outcomes are similar. Doing so should minimize the ancillary costs to market participants, which is particularly important in a small open economy such as Canada, where many transactions are necessarily cross-border.

The focus is now shifting from implementing reforms to monitoring their effects on market functioning and evolution. Regulators are committed to ensuring that the reforms are achieving their intended objectives: to improve transparency, mitigate systemic risk and protect against market abuse. They will also want to understand if the market is affected in unintended ways and take action when appropriate. The new trade repository data enable regulators to better understand OTCD markets so that

15 An equivalence determination means that, in a cross-border trade, it is sufficient for counterparties to comply with the rules of their home jurisdictions. This significantly reduces the regulatory complexity of cross-border trades.

16 For more information on the extent of market fragmentation, see ISDA (2016).

in the future the rules can be refined to balance the evolving costs and benefits of the reforms. To improve the usefulness of the reported data for systemic risk analyses, it is important that global standards for the reported data be developed through the ongoing collaboration of market participants, trade repositories and regulators.

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